The PHOTOFACT® Servicer

SET 467 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ DEC., 1959

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This Servicer provides you with essential data on other models or special equipment not covered in standard PHOTOFACT folders. The schematics and supplementary data included here will be of valuable help to you in servicing this equipment.

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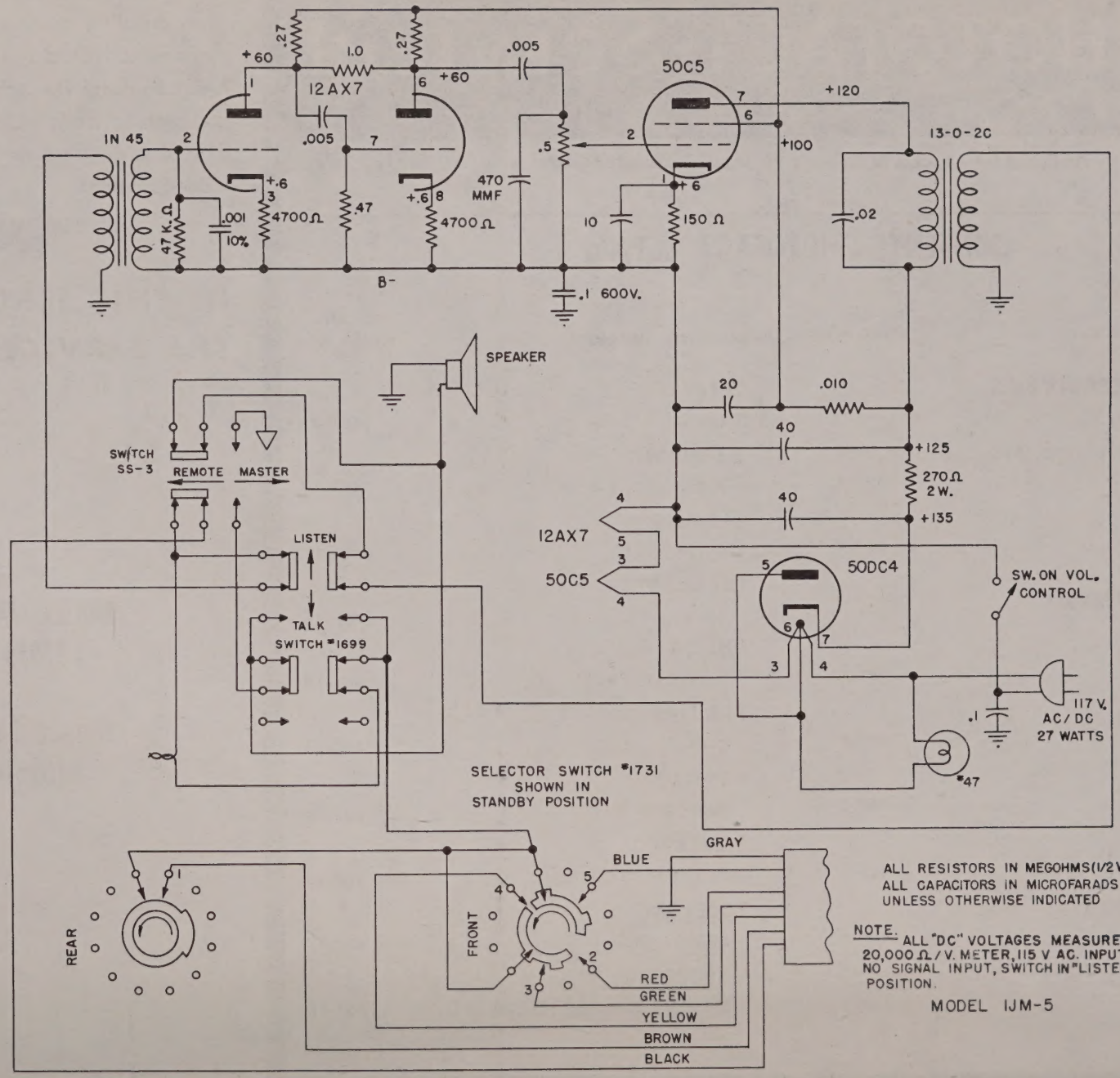
Masco Model
IJM-10

MASCO MODEL IJM-5

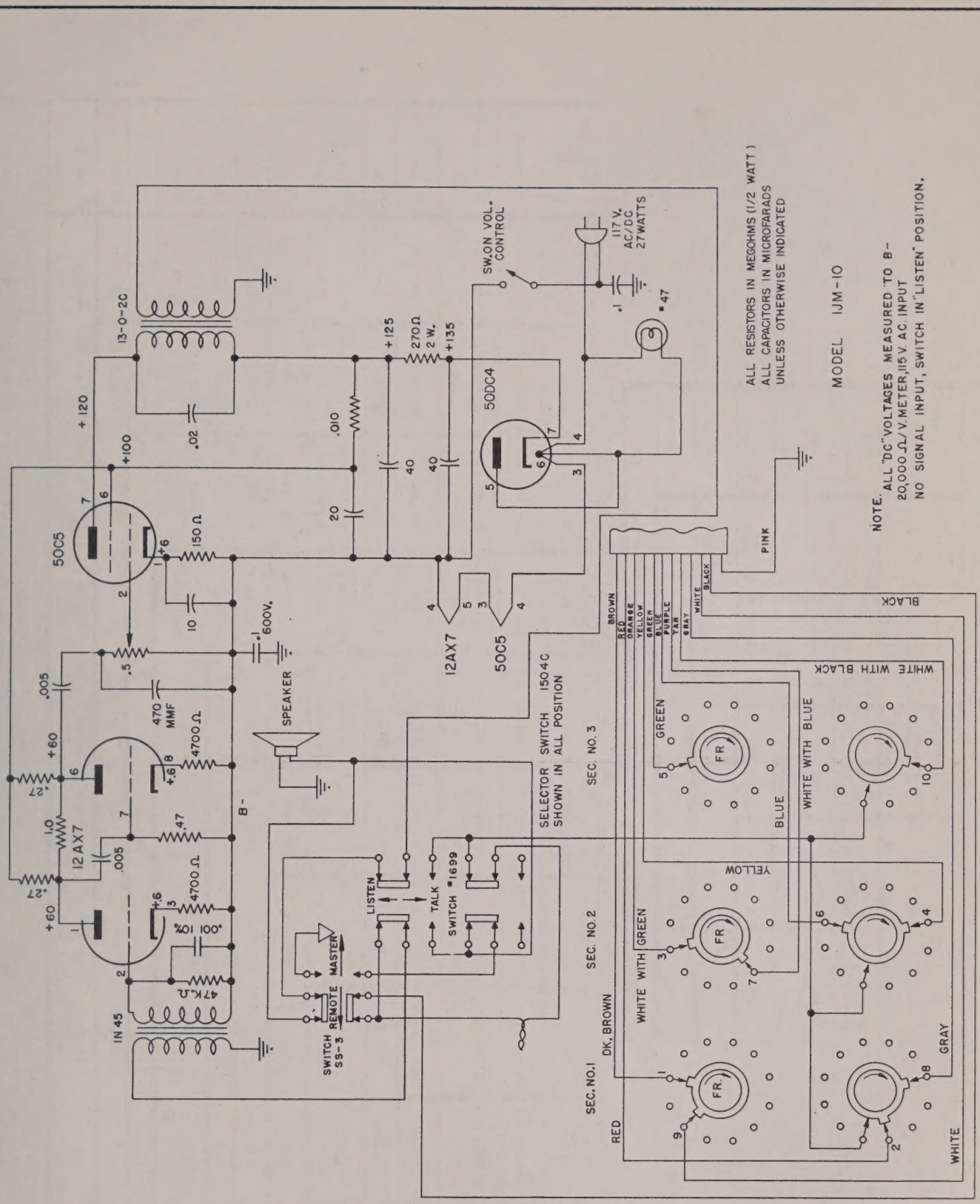
Schematic Diagram Courtesy of Mark Simpson Mfg. Co. Inc.



ALL RESISTORS IN MEGOHMS(1/2 WATT)
ALL CAPACITORS IN MICROFARADS
UNLESS OTHERWISE INDICATED

NOTE. ALL "DC" VOLTAGES MEASURED TO B-
20,000Ω/V. METER, 115 V AC. INPUT
NO SIGNAL INPUT, SWITCH IN "LISTEN"
POSITION.

MODEL IJM-5



MASCO MODEL IJM-10

Schematic Diagram Courtesy of Mark Simpson Mfg. Co. Inc.

INTERCONNECTION CHART IJM -5 MASTER-TO-MASTER SYSTEM

	2-Station System	3-Station System	4-Station System	5-Station System	6-Station System
Station #1	Station #2	Station #3	Station #4	Station#5	Station #6
Slate (Gray)	Slate (Gray)	Slate (Gray)	Slate (Gray)	Slate (Gray)	Slate (Gray)
Black	Brown	Brown	Brown	Brown	Brown
Red	Black	Red	Red	Red	Red
Yellow	Yellow	Black	Yellow	Yellow	Yellow
Green	Green	Green	Black	Green	Green
Blue	Blue	Blue	Blue	Black	Blue
Brown	Red	Yellow	Green	Blue	Black

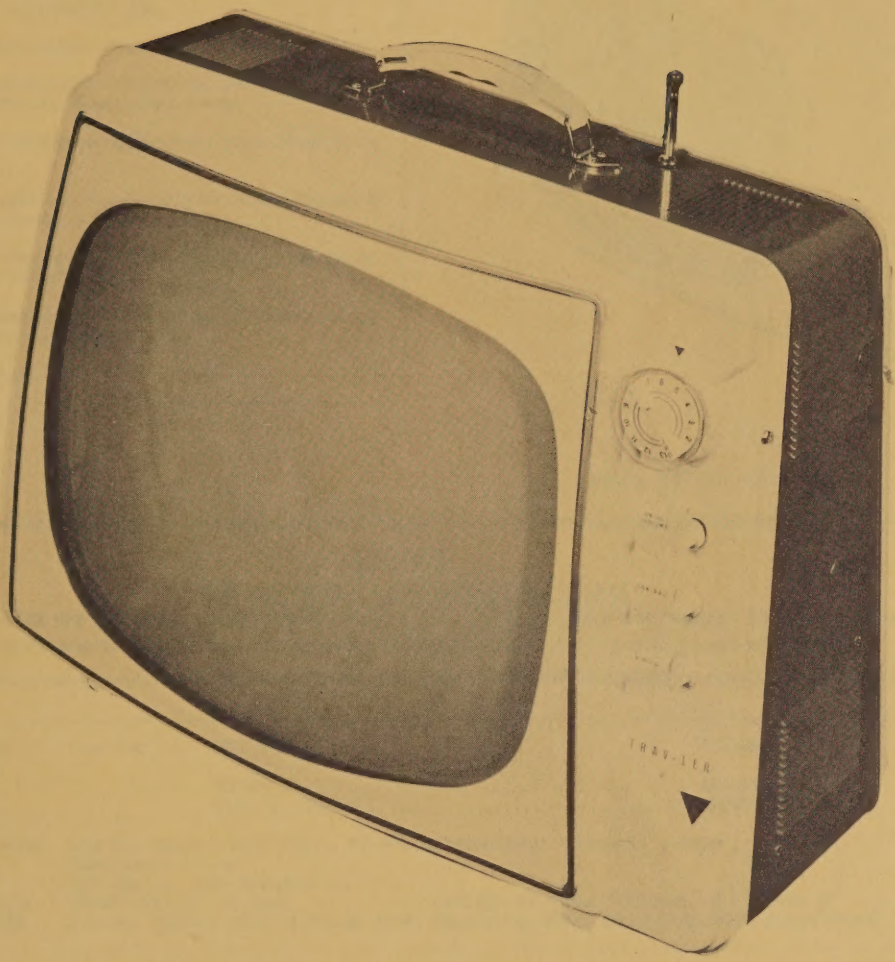
INTERCONNECTION CHART IJM-10 MASTER-TO-MASTER SYSTEM

	2-Station System	3-Station System	4-Station System	5-Station System	6-Station System	7-Station System	8-Station System	9-Station System	10-Station System	11-Station System
Station #1	Station #2	Station #3	Station #4	Station #5	Station #6	Station #7	Station #8	Station #9	Station #10	Station #11
White and Red	White and Red	White and Red	White and Red	White and Red	White and Red	White and Red	White and Red	White and Red	White and Red	White and Red
Black	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Red	Black	Red	Red	Red	Red	Red	Red	Red	Red	Red
White and Green	White and Green	Black	White and Green	White and Green	White and Green	White and Green	White and Green	White and Green	White and Green	White and Green
Yellow	Yellow	Yellow	Black	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Green	Green	Green	Green	Black	Green	Green	Green	Green	Green	Green
Blue	Blue	Blue	Blue	Blue	Black	Blue	Blue	Blue	Blue	Blue
White and Blue	Whi te and Blue	White and Blue	White and Blue	White and Blue	White and Blue	Black	White and Blue	White and Blue	White and Blue	White and Blue
Gray	Gray	Gray	Gray	Gray	Gray	Gray	Black	Gray	Gray	Gray
White	White	White	White	White	White	White	White	Black	White	White
White and Black	White and Black	White and Black	White and Black	White and Black	White and Black	White and Black	White and Black	White and Black	Black	White and Black
Brown	Red	White and Green	Yellow	Green	Blue	White and Blue	Gray	White	White and Black	Black

PHOTOFACT* Folder

TRAV-LER MODELS X1770, U, 1788, U, 1790, U (Ch. 1150-19, 1156-39)

TRAV-LER MODELS X1770, U, 1788, U, 1790, U (Ch. 1150-19, 1156-39)



MODEL 1790 (Ch. 1156-39)

TRAV-LER MODELS X1770, U, 1788, U, 1790, U (Ch. 1150-19, 1156-39)

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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DATE 12 – 59 SET 467 FOLDER 1

SET 467 FOLDER 1

PHOTOFACT* Folder

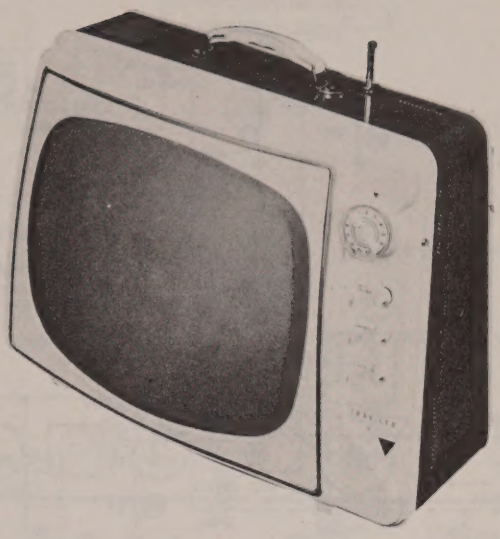
TRAV-LER MODELS X1770, U, 1788, U, 1790, U (Ch. 1150-19, 1156-39)

TRAV-LER MODELS X1770, U, 1788, U, 1790, U (Ch. 1150-19, 1156-39)

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL MODEL 1790

1. Remove 5 push-on type knobs from the front of cabinet.
2. Remove 6 metal screws holding rear cover. Remove antenna connections. Remove rear cover.
3. Remove 5 metal screws holding front glass. Remove the front glass.
4. Remove 3 metal screws holding front control bracket to picture tube mounting strip.
5. Remove speaker leads, picture tube socket, yoke plug, antenna lead and HV lead.
6. Remove 4 chassis bolts from bottom of cabinet and one one each side of chassis.
7. Remove chassis.



MODEL 1790 (Ch. 1156-39)

CAUTION

ONE SIDE OF AC LINE CONNECTED TO CHASSIS.

Care should be exercised when connecting test equipment or physically contacting chassis. Isolation devices employed by manufacturer should be checked and properly connected before returning receiver to owner.

TRADE NAME	Trav-Ler	MODELS	CHASSIS
		X1770, U	1150-19
		1788, U, 1790, U	1156-39
MANUFACTURER	Trav-Ler Radio & Tele. Corp., 571 West Jackson Blvd., Chicago 6, Illinois		
TYPE SET	Television Receiver		
TUBES	VHF-Sixteen, UHF-Seventeen		
POWER SUPPLY	110-120 Volts AC, 60 Cycle	RATING 140 Watts, 1.45 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF,	Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)	

TRAV-LER MODELS X1770, U, 1788, U, 1790, U (Ch. 1150-19, 1156-39)

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

Remove 5 push-on type knobs from the front. Remove 5 screws holding trim. Tilt glass out and remove.

FUSE DEVICE

A 5.5Ω fusible resistor is used for low voltage power supply protection. (For location, see "Tube Placement Chart".)

TUNER OSCILLATOR ADJUSTMENTS

To touch-up VHF Oscillator, remove plug in side of cabinet.

AGC

The AGC may be varied by means of an AGC control. (For location, see "Tube Placement Chart".)

FOCUS

No provision is made to vary the focus on this receiver.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

The Horizontal Frequency slug is used for the Horizontal Hold. (For location, see "Tube Placement Chart".)

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

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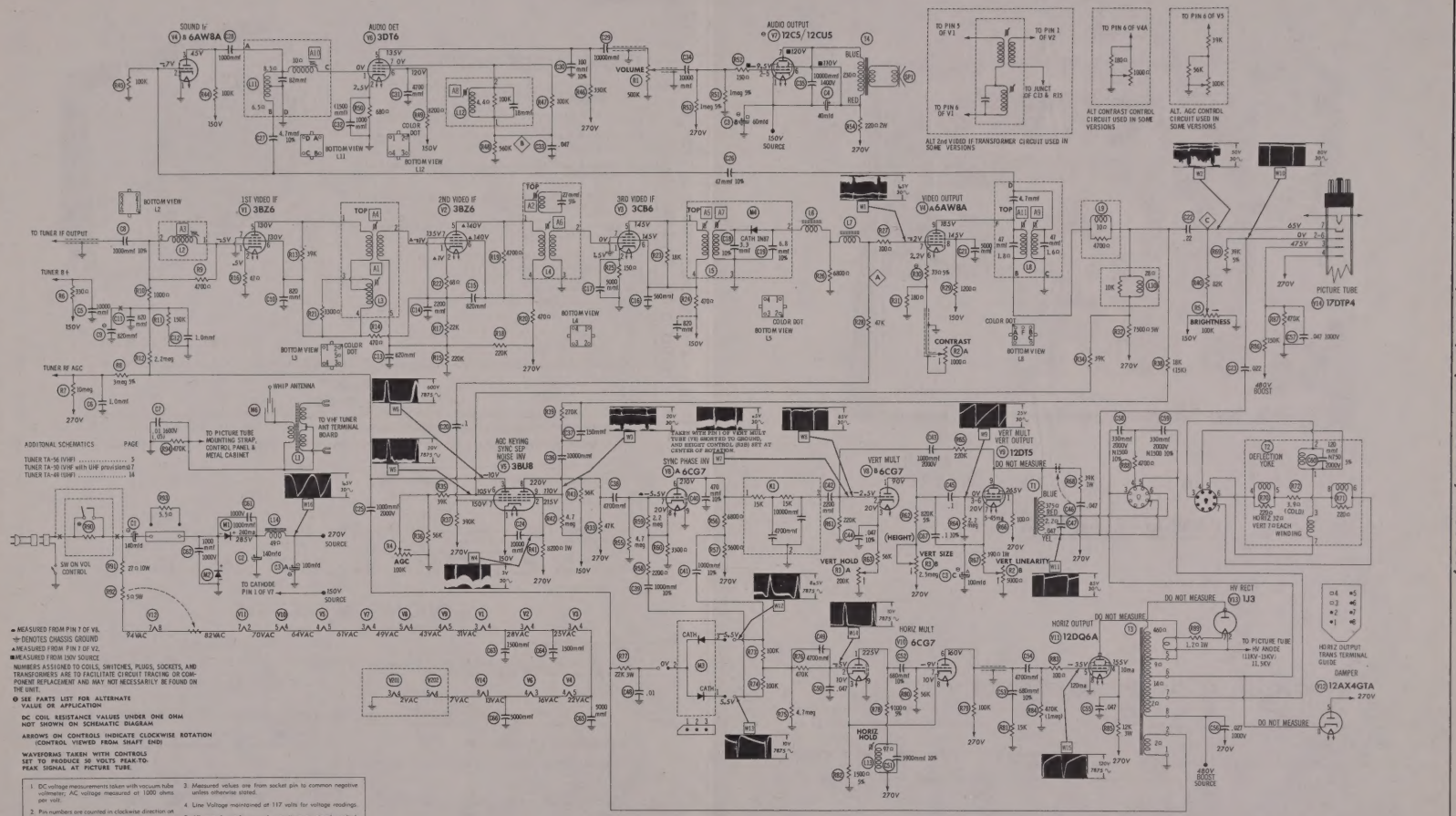
JA659

SET 467 FOLDER 1


SOUND IF V4 6AW8A
AUDIO DET V6 3DT6
AUDIO OUTPUT V7 12C5/12CU5
VOLUME
TO PIN 9 OF V1
TO PIN 1 OF V2
TO PIN 6 OF V1
TO JUNCT OF C13 & R15
ALT 2nd VIDEO IF TRANSFORMER CIRCUIT USED IN SOME VERSIONS
TO PIN 6 OF V4A
ALT. CONTRAST CONTROL CIRCUIT USED IN SOME VERSIONS
TO PIN 6 OF V5
ALT. AGC CONTROL CIRCUIT USED IN SOME VERSIONS
BOTTOM VIEW L11
BOTTOM VIEW L12
1ST VIDEO IF V1 3BZ6
2ND VIDEO IF V2 3BZ6
3RD VIDEO IF V3 3CB6
VIDEO OUTPUT V4 6AW8A
BOTTOM VIEW L2
BOTTOM VIEW L3
BOTTOM VIEW L4
BOTTOM VIEW L5
BOTTOM VIEW L8
TO TUNER IF OUTPUT
TUNER B+
TUNER RF AGC
WHIP ANTENNA
TO VHF TUNER ANT TERMINAL BOARD
TO PICTURE TUBE MOUNTING STRAP, CONTROL PANEL & METAL CABINET
ADDITIONAL SCHEMATICS PAGE
TUNER TA-56 (VHF) 5
TUNER TA-50 (VHF with UHF provisions) 7
TUNER TA-49 (UHF) 14
SW ON VOL CONTROL
TO CATHODE PIN 1 OF V7
270V SOURCE
150V SOURCE
AGC KEYING SYNC SEP NOISE INV V5 3BU8
SYNC PHASE INV V10 6CG7
VERT MULT V9 6CG7
VERT MULT VERT OUTPUT V5 12DT5
DO NOT MEASURE
VERT HOLD
VERT SIZE
VERT LINEARITY
(HEIGHT)
DEFLECTION YOKE
HORIZ SIZE
HORIZ COIL
VERT COIL
HORIZ MULT V10 6CG7
HORIZ HOLD
HORIZ OUTPUT V11 12DQ6A
HV RECT V13 1J3
TO PICTURE TUBE HV ANODE (11KV-13KV) 11.5KV
DAMPER V13 12AX4GTA
480V BOOST SOURCE
PICTURE TUBE V14 17DTP4
BRIGHTNESS
CONTRAST
COLOR DOT
TAKEN WITH EHT OF TEST MULTI TUBE (Y8) SHORTED TO GROUND, AND HEIGHT CONTROL (R68) SET AT CENTER OF ROTATION.
▲ MEASURED FROM PIN 7 OF V8.
⊣ DENOTES CHASSIS GROUND
▲ MEASURED FROM PIN 7 OF V2.
■ MEASURED FROM 150V SOURCE
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.
⊕ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM.
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1000 ohms per volt.
2. Pin numbers are counted in clockwise direction at bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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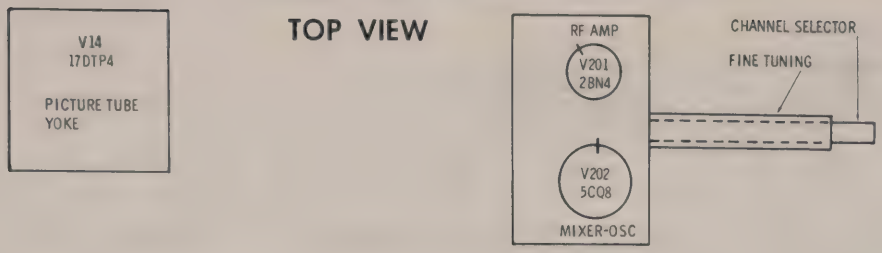
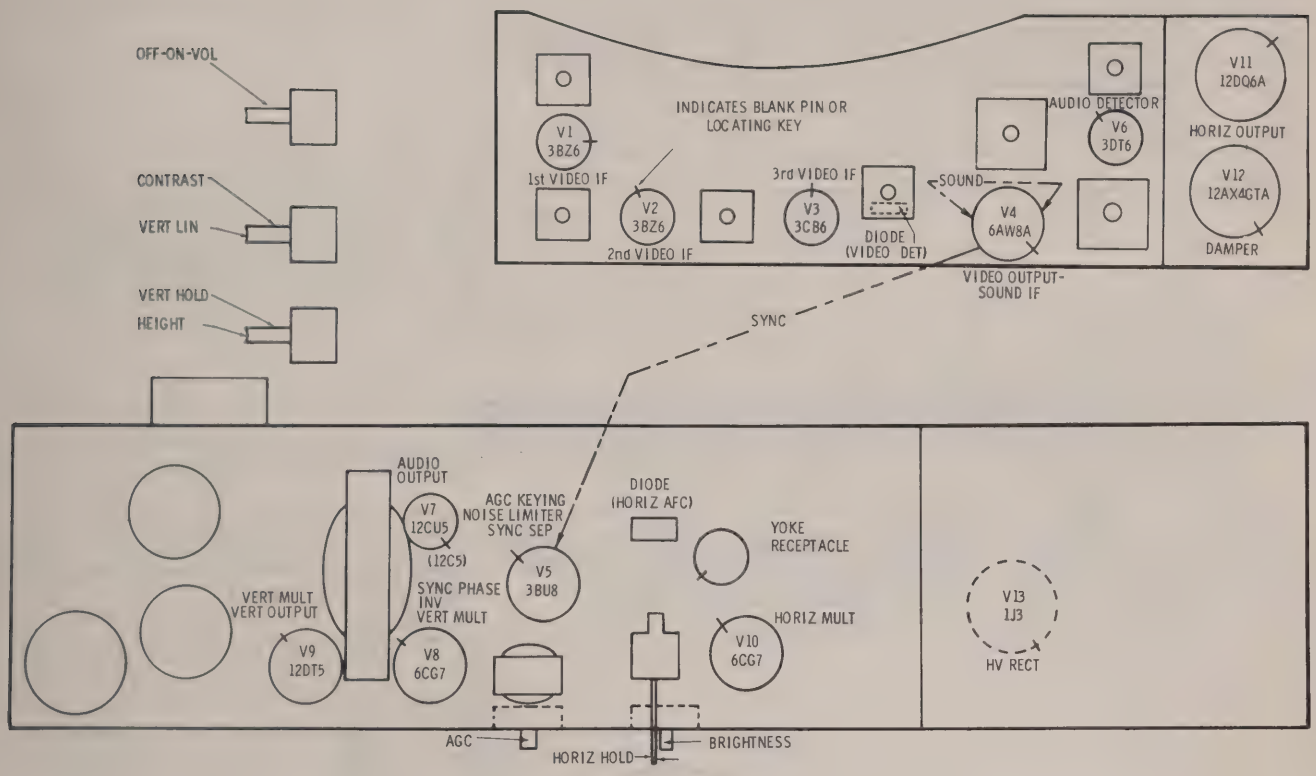
TRAV-LER MODELS X1770, U, 1788, U, 1790, U (Ch. 1150-19, 1156-39)

TUBE PLACEMENT CHART

TOP VIEW





TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

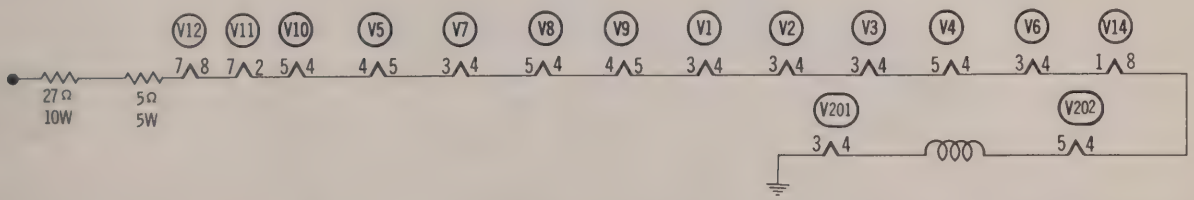
POWER SUPPLY FAILURE
No raster, no sound Fusible Resistor, Rect. (B+)

SWEEP FAILURE
No raster, has sound V10, V11, V12, V13, V14
No vertical deflection V8, V9
Poor vert. linearity or foldover V8, V9
Poor horiz. linearity or foldover V10, V11, V12
Narrow picture V10, V11, V12, Rect. (B+)
Vert. off freq. V8, V9
Horiz. off freq. V8, Diode (Horiz. AFC), V10

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, Diode (Video Det.), V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V4, V14
Has pic, no sound V4, V6, V7
Overloaded picture V5

SYNC FAILURE
No vert. sync V5, V8
No horiz. sync V5, V8
No vert. or horiz. sync V5, V8

This receiver employs tubes used in a series filament network, an open filament in any tube will cause the set to be inoperative. (See circuit below.)



TRAV-LER MODELS X1770, U, 1788, U, 1790, U (Ch. 1150-19, 1156-39)

FOLDER 1

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

Use an ISOLATION TRANSFORMER TO PROTECT the Test Equipment.
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: GENERAL CEMENT #8282, 8606, 8606L, 9295
WALSCO #2526, 2543, 2544, 2545

VIDEO IF ALIGNMENT

Set Contrast fully clockwise.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	Place a thin insulated metal strip between the Mixer-Osc. tube (V202), and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	44MC (10MC Swp)	41.25MC	Any non-interfering channel	Vert. Amp. thru 47K to point (A). Low side to chassis. (Across Video Det. load)	A1	Adjust to place marker in 41.25MC trap notch. (See Fig. 1).
2.	"	"	"	47.25MC	"	"	A2	Adjust to place marker in other trap notch.
3.	"	"	"	42.75MC 45.75MC	"	"	Mixer Plate Coil & A3 thru A7	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown. Adjust Mixer Plate Coil and A3 for maximum gain. A4 and A5 to shape high frequency side of response curve. A6 and A7 is adjusted to shape low frequency side.

SOUND IF ALIGNMENT

Connect an output meter across speaker voice coil.
Connect the DC probe of the VTVM to point (B). Common to chassis. Tune in a strong air signal and adjust A8 for maximum output. If two peaks occur during this adjustment, use the one resulting in the highest reading on the VTVM.
Reduce the signal strength by disconnecting the antenna. Adjust A9 and A10 for maximum undistorted sound. Further reduce the signal by moving the antenna lead further away. Retouch A9 and A10 for maximum undistorted sound. Repeat entire procedure if necessary.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
4.	.05mfd	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	AC probe to point (C). Common to chassis. (Use 0-10VAC scale).	All	Adjust for MINIMUM deflection.

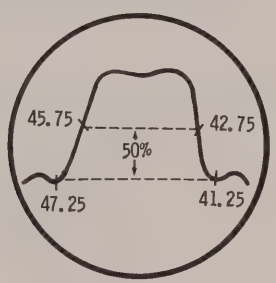
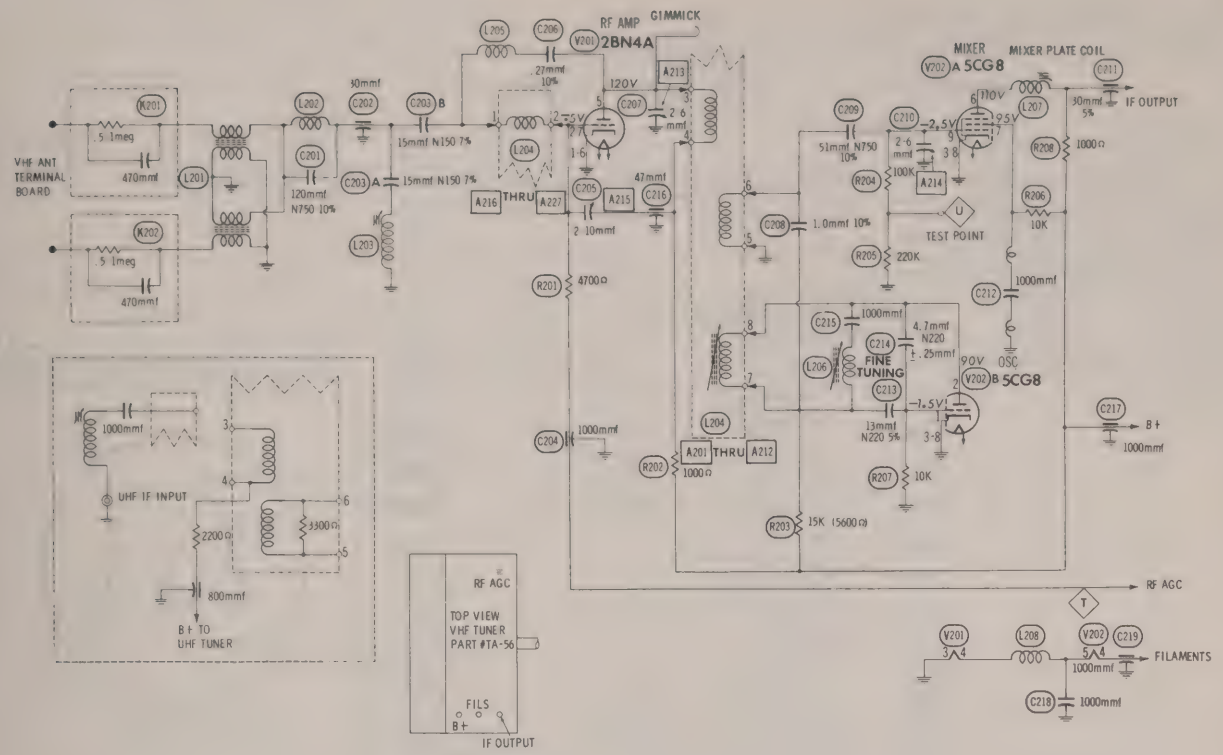


FIG 1

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGES 6, 8



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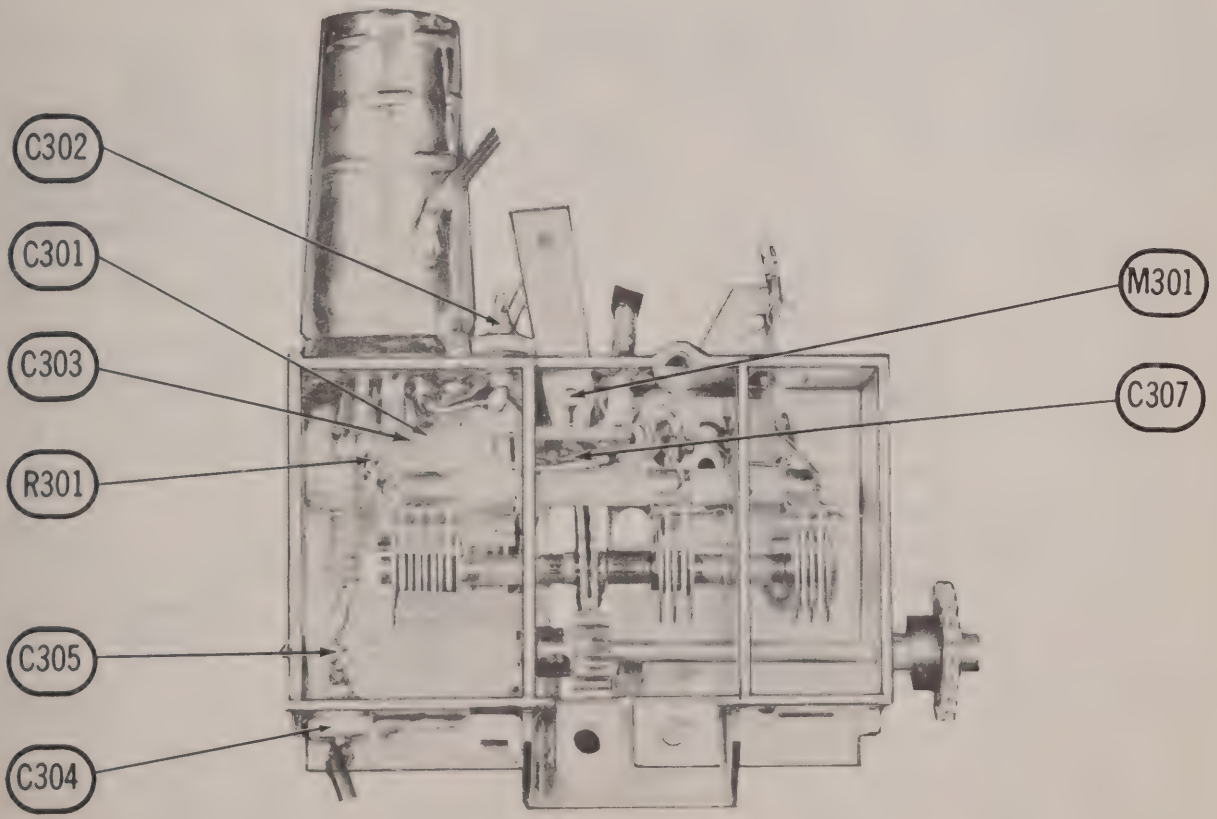
VHF TUNER TA-56



TUNER TA-49

TUNER ALIGNMENT INSTRUCTIONS

TA-56

PRE-ALIGNMENT INSTRUCTIONS

The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: A201 thru A212 ..... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8987
WALSCO #2531
A213, A214, A215..... GENERAL CEMENT #5000, 5003, 8276, 8290
WALSCO #2512, 2525

VHF OSCILLATOR ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading.
Set the Fine Tuning to the center of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K across Video Det. load.	A201	Adjust to place sound marker in trap notch as in Fig. 201. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A202	
			201MC	199.25MC 203.75MC	11		A203	
			195MC	193.25MC 197.75MC	10		A204	
			189MC	187.25MC 191.75MC	9		A205	
			183MC	181.25MC 185.75MC	8		A206	
			177MC	175.25MC 179.75MC	7		A207	
			85MC	83.25MC 87.75MC	6		A208	
			79MC	77.25MC 81.75MC	5		A209	
			69MC	67.25MC 71.75MC	4		A210	
			63MC	61.25MC 65.75MC	3		A211	
			57MC	55.25MC 59.75MC	2		A212	

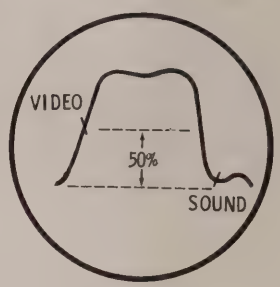


FIG. 201

VHF RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.
Connect the negative lead of a 4.5 volt bias supply to point (T). Positive to chassis.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
2.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC	193.25MC 197.75MC	10	Vert. Amp. thru 10K to point (U). Low side to chassis.	A213, A214, A215	Adjust A213 and A214 for maximum amplitude and symmetry with markers as shown in Fig. 202. Increase bias for MINIMUM amplitude of response curve. Without changing the bias adjust A215 to obtain MINIMUM response on the scope. Restore bias.
3.	"	"	213MC	211.25MC 215.75MC	13	"	A216	Adjust for maximum amplitude of response similar to Fig. 202. Adjust by compressing or expanding coil turns.
			207MC	205.25MC 209.75MC	12		A217	
			201MC	199.25MC 203.75MC	11		A218	
			195MC	193.25MC 197.75MC	10		A219	
			189MC	187.25MC 191.75MC	9		A220	
			183MC	181.25MC 185.75MC	8		A221	
			177MC	175.25MC 179.75MC	7		A222	
			85MC	83.25MC 87.75MC	6		A223	
			79MC	77.25MC 81.75MC	5		A224	
			69MC	67.25MC 71.75MC	4		A225	
			63MC	61.25MC 65.75MC	3		A226	
			57MC	55.25MC 59.75MC	2		A227	

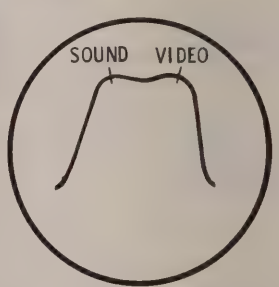
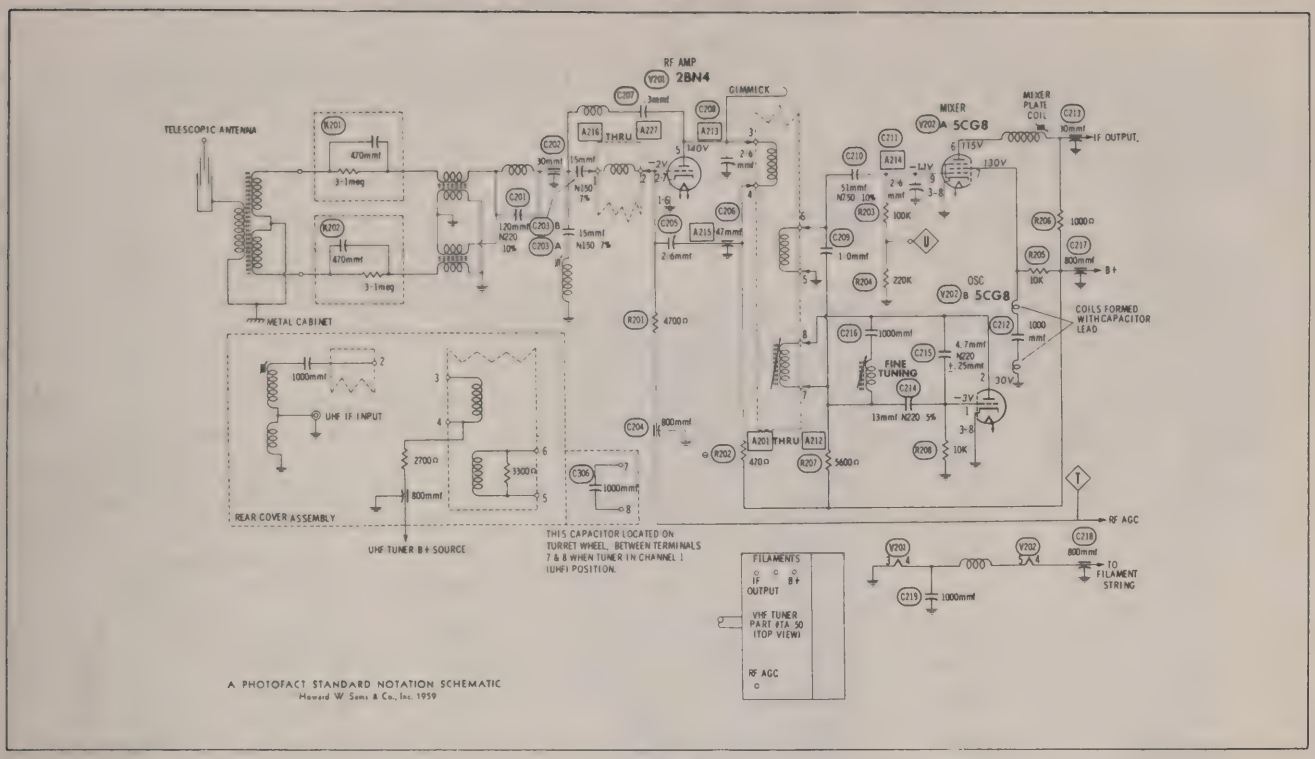


FIG. 202



A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W Sams & Co., Inc. 1959

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
	◆ CBS ◆ GENERAL ELECTRIC ◆			◆ RAYTHEON ◆ SYLVANIA ◆	
V201	RF Amplifier	2BN4	V202	Mixer - Osc.	5CG8

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C201	120 N220 10%					*		10TCR-T12
C202	30							
C203A	15 N150 7%					▪		10TCP-Q15
B	15 N150 7%					▪		10TCP-Q15
C204	800		EF-001	MFT-1000		CCF-102		
C205	2-6			829-6		VC-3	CT552	
C206	47		EF-000050	MFT-50				
C207	.3							
C208	2-6			829-6		VC-3	CT552	
C209	1		NPO-SI 1.0	TCZ-1			CNO-510	10TCC-V10
C210	51 N750 10%		N750-DI 47	TCN-51	C10Q51U	CCTN-470	CN7-447	10TCU-Q47
C211	2-6			829-6		VC-3	CT552	
C212	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	10TS-D10
C213	30							
C214	13 N220 5%					▪		
C215	4.7 N220 ±.25mmf					▪		
C216	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	10TS-D10
C217	800		EF-001	MFT-1000		CCF-102	CT280A	
C218	800		EF-001	MFT-1000		CCF-102	CT280A	
C219	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	10TS-D10

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
Note: Part numbers listed above are "Standard Coil" Part Numbers.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	PART No.	NOTES
R201	4700Ω		12TAE472M-01-02-03	
R202	470Ω			Note 1
R203	100K		12TAE104M-01-02-03	
R204	220K		12TAE224M-01-02-03	

ITEM No.	RATING OHMS	RATING WATT	PART No.	NOTES
R205	10K		12TAE103M-01-02-03	
R206	1000Ω		12WAE102M-01	
R207	5600Ω		12TAE562K-01-02-03	
R208	10K		12TAE103M-01-02-03	

Note 1. Some versions may use 1000Ω in this application (Part #12TAE102M-01-02-03).
NOTE: Part numbers listed above are "Standard Coil" Part Numbers.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	PART No.	REPLACEMENT DATA	
K201	Antenna Isolation	470mmf, .3-1meg		Centralab	RC-471
				Sprague	ACl-1
K202	Antenna Isolation	470mmf, .3-1meg		Centralab	RC-471
				Sprague	ACl-1

TUNER ALIGNMENT INSTRUCTIONS
TA-50

PRE-ALIGNMENT INSTRUCTIONS

Use an ISOLATION TRANSFORMER TO PROTECT the Test Equipment.
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: A201 thru A212 ... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8987
WALSCO # 2531
A213 thru A215 .... GENERAL CEMENT #5000, 5003, 8276, 8290
WALSCO #2512, 2525

VHF OSCILLATOR ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the Fine Tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K across Video Det. load.	A201	Adjust to place sound marker in trap notch as in Fig. 201. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A202	
			201MC	199.25MC 203.75MC	11		A203	
			195MC	193.25MC 197.75MC	10		A204	
			189MC	187.25MC 191.75MC	9		A205	
			183MC	181.25MC 185.75MC	8		A206	
			177MC	175.25MC 179.75MC	7		A207	
			85MC	83.25MC 87.75MC	6		A208	
			79MC	77.25MC 81.75MC	5		A209	
			69MC	67.25MC 71.75MC	4		A210	
			63MC	61.25MC 65.75MC	3		A211	
			57MC	55.25MC 59.75MC	2		A212	

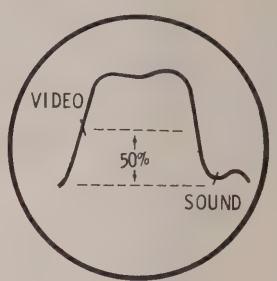


FIG.201

VHF RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.
Connect the negative lead of a 4.5 volt bias supply to point (T). Positive to chassis.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
2.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC	193.25MC 197.75MC	10	Vert. Amp. thru 10K to point (U). Low side to chassis.	A213, A214, A215	Adjust A213 and A214 for maximum amplitude and symmetry with markers as shown in Fig. 202. Increase bias for MINIMUM amplitude of response curve. Without changing the bias adjust A215 to obtain MINIMUM response on the scope. Reduce bias.
3.	"	"	213MC	211.25MC 215.75MC	13	"	A216	Adjust for maximum amplitude of response similar to Fig. 202. Adjust by expanding or compressing coil turns.
			207MC	205.25MC 209.75MC	12		A217	
			201MC	199.25MC 203.75MC	11		A218	
			195MC	193.25MC 197.75MC	10		A219	
			189MC	187.25MC 191.75MC	9		A220	
			183MC	181.25MC 185.75MC	8		A221	
			177MC	175.25MC 179.75MC	7		A222	
			85MC	83.25MC 87.75MC	6		A223	
			79MC	77.25MC 81.75MC	5		A224	
			69MC	67.25MC 71.75MC	4		A225	
			63MC	61.25MC 65.75MC	3		A226	
			57MC	55.25MC 59.75MC	2		A227	

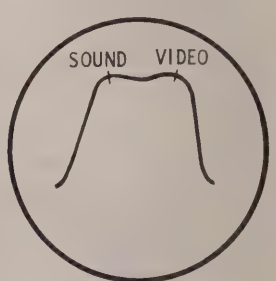
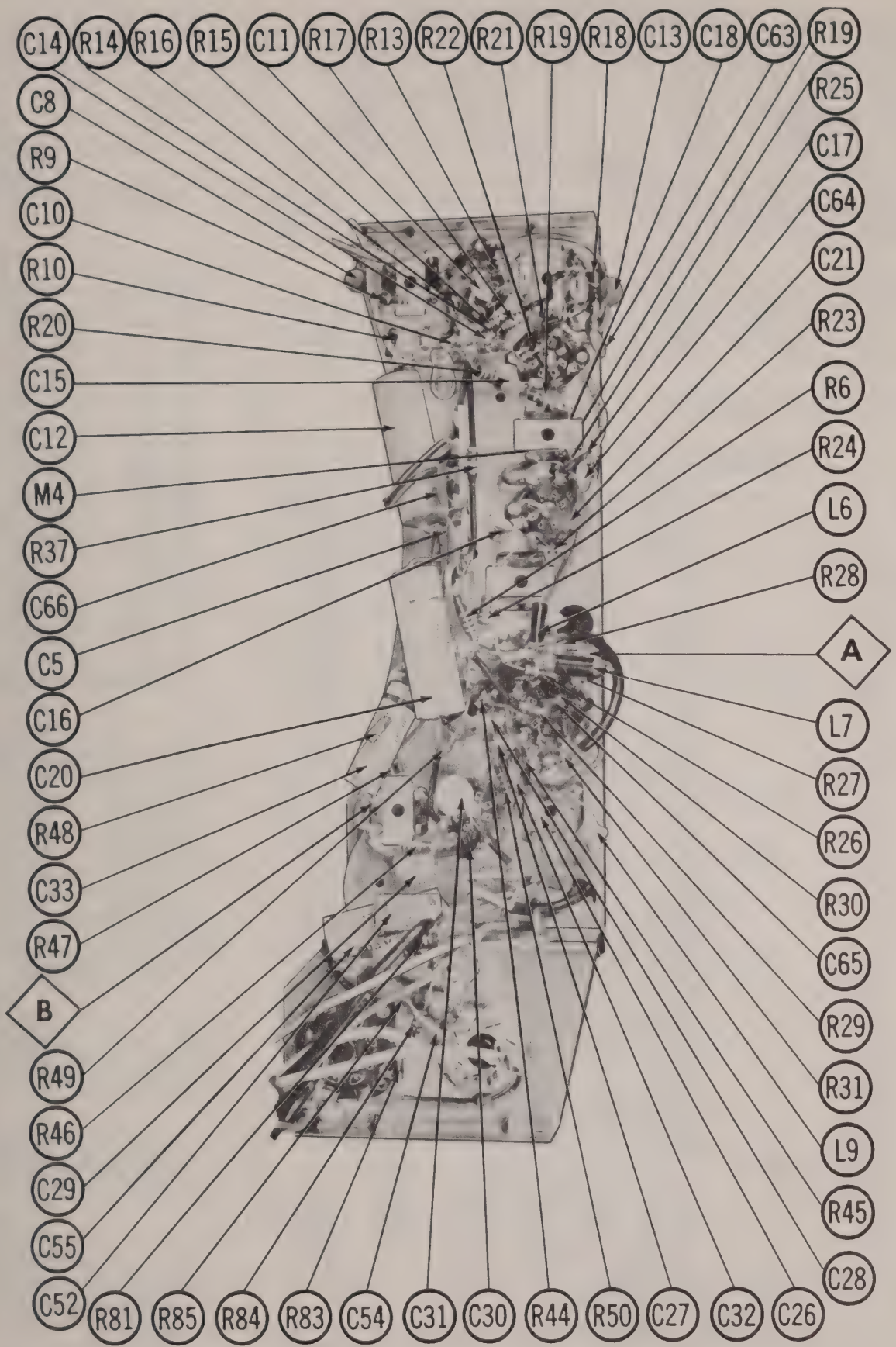


FIG.202

UHF ALIGNMENT

This portion of the tuner has been properly aligned at the factory and is very stable. Alignment of this portion should not be attempted in the field.



UPPER CHASSIS - BOTTOM VIEW

SET 467 FOLDER 1

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA • USE	TYPE	ITEM No.	USE	TYPE
V1	1st Video IF Amp.	3B26	V7	Audio Output	12CU5/13C5
V2	2nd Video IF Amp.	3B26	V8	Sync Phase Inv. - Vert. Mult.	6CQ7
V3	3rd Video IF Amp.	3C26	V9	Vert. Mult. - Vert. Output	12DT5
V4	Video Output-Sound IF Amp.	6AW8A	V10	Horiz. Mult.	6CQ7
V5	AGC Keying-Sync Sep. - Noise Inverter	2BU8	V11	Horiz. Output	12DQ8A
V6	Audio Detector	3DT6	V12	Damper	12AX4GTA
			V13	HV Rect.	1Z3

PICTURE TUBE

ITEM No.	REPLACEMENT DATA: TRAV-LER PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
V14	17DTP4				17DTP4 ①	① "Silver Screen 85"

ELECTROLYTIC CAPACITORS

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: TRAV-LER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	140	200	EC-84	AFSR-37-25	XA0266	FP131	TMS-34	TVL-1540	Note 1
C2	140	300	EC-118	AFSR-37-25	XA0355	FP131	TMS-42	TVL-1584	
C3A	●100	300	EC-130	AFSR4-100-20	D0044 BR1005	FP426.5	TMS-169	TVL-4711	Note 3
B	●60	300							
C	▲100	50							
C4	▲ 200	250	EC-113	PRS8580	BR4035	TC86	TD-40-350	TVA-1511	

Note 1. Ch. 1150-19 use 300mfd ② 150V (Part #EC-84A).
Note 2. Ch. 1150-19 use 100mfd ② 300V, 60mfd ② 300V, 100mfd ② 50V. (Part #EC-66A).

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	10000		BPD-01	DD-103	BYA10SE	CCD-103	B-310	5HK-D10
C6	1.0 100V		P388N-1.0		CUB2W1		GEM-2I	2TM-M1
C7	.01 1600V	(.06mfd)*	P1864CM-01	DD5E-103	CUB16E	16DP-3-103	GEM-1611	M3-E
C8	1000 10%		DI-1000	DD-102	1R3D1	CCD-102	GP120	10T5-D10
C9	820	Note 1	DI-820	DD-821	BYA10T82	CCD-821	B-382	5GA-T82
C10	820		DI-820	DD-831	BYA10T83	CCD-831	B-383	5GA-T83
C11	820		DI-820	DD-821	BYA10T82	CCD-821	B-382	5GA-T82
C12	1.0 100V		P388N-1.0		CUB2W1		GEM-2I	2TM-M1
C13	820		DI-820	DD-821	BYA10T82	CCD-821	B-382	5GA-T82
C14	2200		BPD-022	DD-222	BYA10D22	CCD-222	B-322	5HK-D22
C15	820		DI-820	DD-821	BYA10T82	CCD-821	B-382	5GA-T82
C16	560		DI-560	DD-561	L10T56	CCD-561	B-356	5GA-T56
C17	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-350	5HK-D50
C18	3.3 10%		NPO-SI 3.3	TCZ-3R3	C10V3JC	CCT0-3R3	CNO-3R3	10TCC-Y3
C19	6.8 10%		NPO-SI 6.8	DTZ-6R8	C10V6JC	CCT0-6R8	CNO-6R8	10TCC-Y6
C20	.1 800V		P688N-1	DF-104	CUB8F1	6DP-4-104	GEM-801	6TM-F1
C21	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-350	5HK-D50
C22	.22 400V		P488N-22		CUB4P22	4DP-5-224	GEM-4022	
C23	.022 600V		P688N-022	DD-203	CUB6S22	6DP-2-223	GEM-6123	6TM-S22
C24	1000 10%		BPD-01	DD-103	BYA10D1	CCD-103	B-310	5HK-D10
C25	1000 2000V		HVD-30-1000	DD80-102	HVB20D1	VCM-35-102	2HV-210	B1-D10
C26	47 10%		NPO-SI 47	DD-470	C10J47C	CCD-470	GP447	10T5-Q47
C27	4.7 10%		NPO-SI 4.7	TCZ-4R7	C10V47C	CCT0-4R7	CNO-547	10TCC-Y47
C28	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-310	5HK-D10
C29	10000		BPD-01	DD-103	BYA10E1	CCD-103	B-310	5HK-E10
C30	100 10%		DI-100	DD-101	L10T1	CCD-101	GP-310	10T5-T10
C31	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-347	5HK-D47
C32	1000	(.0500mmf)*	BPD-001	DD-102	BYA10D1	CCD-103	B-310	5HK-D10
C33	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C34	1000		BPD-01	DD-103	BYA10E	CCD-103	B-310	5HK-E10
C35	10000 1400V		DAC-37	DD5E-103	HVK15E	16DP-3-103	UAC-110	B1-E10
C36	10000		BPD-01	DD-103	BYA10E	CCD-103	B-110	5HK-E10
C37	150		BPD-00015	DD-151	L10T15	CCD-151	GP-315	5GA-T15
C38	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-347	5HK-D47
C39	1000 10%		DI-1000	DD-102	1R3D1	CCD-103	GP310	10T5-D10
C40	470 10%		DI-470	DD-471	1R5T47	CCD-471	GP347	10T5-T47
C41	1000 10%		DI-1000	DD-102	1R3D1	CCD-102	GP120	10T5-D10
C42	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-322	5HK-D22
C43	1000 3000V		HVD-30-1000	DD80-103	HVB20D1	VCM-35-103	2HV-310	B1-D10
C44	.047 600V 10%		V84C6S47-10%		PM6S47	6DP-3-473	GEM-4615	6TM-S47
C45	.1 600V		P688N-1	DF-104	CUB6F1	6DP-4-104	GEM-601	6TM-F1
C46	.047 600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C47	.047 800V		P888N-047	DD-503	CUB8S47	8DP-3-473	GEM-8147	8TM-S47
C48	.01 800V		P888N-01	DD-103	CUB8E	8DP-3-103	GEM-681	8TM-S1
C49	4700		BPD-047	DD-472	BYA10D47M	CCD-472	B-274	5HK-D47
C50	.047 800V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C51	3900 10%		1484-0039		1R5D39	CM-20B-392K	MCB463	M3-239
C52	680 10%		1468-00068	DD-681	1R5T68	CM-20B-681K	MCJ249	M3-368
C53	680 10%		1468-00068	DD-681	1R5T68	CM-20B-681K	MCJ249	M3-368
C54	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-347	5HK-D47
C55	.047 600V		P688N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C56	.047 1000V		P108S47M-02T	DD6K-302	CUB10S47	10DP-3-303	GEM-1043	10TM-S3
C57	.047 1000V		P108N-047		CUB10S47	10DP-5-473	GEM-10147	10TM-S47
C58	330 3000V M1500 10%	#CC-119				**		
C59	330 2000V M1500 10%	#CC-119				**		
C60	120 2000V M750 5%					**		
C61	1000 1000V		BPD-001	DD-102	BYA10D1	CCD-102	B-310	5HK-D10
C62	1000 1000V		BPD-001	DD-102	BYA10D1	CCD-102	B-310	5HK-D10
C63	1800		BPD-0015	DD-182	BYA10D15	CCD-182	B-315	5HK-D15
C64	1800		BPD-0015	DD-182	BYA10D15	CCD-182	B-315	5HK-D15
C65	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-350	5HK-D50
C66	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-350	5HK-D50
C67	.1 600V 10%		V84C6P1-10%		PM6P1	6DP-4-104		6TM-F1

* Alternate value. # Trav-Ler Part Number. Note 1. Not used in some versions.
** Not normally in distributor's stock. Available thru distributor or order to manufacturer.

CONTROLS

ITEM No.	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: TRAV-LER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	VC-120			P25SA		Volume
B	Switch					Not Req.		Push-Pull Off-On
R2A	100KΩ	½	VC-196	F1-S			▪ UF4067	Contrast
B	5000Ω	½		R3-19			† GJ-1139	Vert. Lin.

CONTROLS (cont)

ITEM No	RATING: RESIST ANCE	WATTS	REPLACEMENT DATA: TRAV-LER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R3A	200K	½	VC-194	F1-33 *		◊	*	Vert. Hold
B	2.5meg	½		R3-77				Vert. Size
R4A	100K	½	VC-84	BK-60	B47-100K-S	B11-128	PTA15L	AGC
B	Shaft			Not Req.	Not Req.	Not Req.	PTA15L	
R5A	100K	½	VC-84	BK-60	B47-100K-S	B11-128	PTA15L	Brightness
B	Shaft			Not Req.	Not Req.	T364	Not Req.	

† "Concentrikit" Equivalent: K-15 Kit with Base Elements & Shafts: B17-108, P17-028 (Panel) B11-114, R15-005 (Rear)

◊ "Concentrikit" Equivalent: K-15 Kit with Base Elements & Shafts: B11-129, P17-028 (Panel) (Not available as a factory assembled unit) B11-130, R15-005 (Rear)

▪ "STA-LOC" Equivalent: FA13R, RU53L, C6875A, 13437.

* "STA-LOC" Equivalent: FA35L, RU35L, C6875A, 13437.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R6	330Ω	
R7	10meg	
R8	3meg 5%	
R9	4700Ω	
R10	1000Ω	
R11	180K	
R12	2.2meg	
R13	39K	
R14	470Ω	
R15	220K	
R16	47Ω	
R17	22K	
R18	220K	
R19	4700Ω	
R20	470Ω	
R21	3300Ω	
R22	68Ω	
R23	18K	
R24	470Ω	
R25	150Ω	
R26	68000Ω	
R27	100Ω	
R28	47K	
R29	12000Ω	
R30	330 5%	Note 1
R31	3300Ω	
R32	7500Ω 5W	#WR-48
R33	47K	
R34	39K	
R35	39K	

ITEM No.	RATING	REMARKS
R36	56K	
R37	390K	
R38	18K	(18K)*
R39	270K	
R40	82K	
R41	8200Ω 1W	
R42	4.7meg	
R43	56K	
R44	100K	
R45	100K	
R46	330K	
R47	100K	
R48	560K	
R49	8200Ω	
R50	680Ω	
R51	1meg 5%	
R52	150Ω	
R53	1meg 5%	
R54	2200 3W	
R55	4.7meg	
R56	68000Ω	
R57	5600Ω	
R58	2200Ω	
R59	1.2meg	
R60	3300Ω	
R61	220K	
R62	820K 5%	
R63	56K	
R64	2.2meg 5%	
R65	220K	

ITEM No.	RATING	REMARKS
R66	100Ω	
R67	3900 1W	
R68	39K 1W	
R69	39K 5%	
R70	2200Ω	
R71	2200Ω	
R72	3.9Ω Cold	#R-284
R73	100K	
R74	100K	
R75	4.7meg	
R76	470K	
R77	22K 3W	
R78	91000Ω 5%	#R-365
R79	100K	
R80	56K	
R81	1K	
R82	18000Ω 5%	
R83	100Ω	
R84	470K	(1meg)*
R85	12K 3W	
R86	180K	
R87	470K	
R88	4700Ω	
R89	1.3Ω 1W	
R90		#F-9 Note 2
R91	27Ω 10W	#WR-26
R92	5Ω 5W	#WR-42
R93	5.5Ω	#F-5-1
R94	470K	

* Trav-Ler Part No. * Alternate value. Note 1. Not used in some versions. Note 2. Not used in Ch. 1150-19.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: TRAV-LER PART No.	Gramer PART No	Meissner PART No.	Merit PART No	Miller PART No	Ram PART No	NOTES
L1	Ant. Matching Coil	L-157				6231 *		
L2	1st Video IF	L-150						
L2A	2nd Video IF	L-103	17-5002	17-5002	-			
B	41.25MC Trap							
L4A	3rd Video IF	L-165	17-5003	17-5003	TV-138	6232		
B	47.25MC Trap							
L5	4th Video IF	L-152						
L6	RF Choke	L-160	19-1005	19-1005	BC-566	6612		10.4uh
L7	RF Choke	L-168						27.5uh
L8A	Sound Take-Off	L-154						
B	4.5MC Trap							
L9	Series Peaking Coil	L-162						①
L10	Shunt Peaking Coil	L-163						①
L11	2nd Sound IF	L-167						①
L12	Quadrature Coil	L-110A	17-1021 a	17-1021 a		1401 a	SD-5 a	

* Disregard secondary winding.
a Parallel with 100K resistor.
① Wound on 470Ω resistor.
② Wound on 10K resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES: PRI.	SEC.	REPLACEMENT DATA: TRAV-LER PART No.	Halldorson PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No.	NOTES
L13	97Ω		L-156	HS-5 *	TV-163 *	6210 *	H-102 *	HS-5 *	Horiz. Stabilizer * Enlarge mounting hole.

FILTER CHOKE

ITEM No.	RATINGS: CURRENT (Measured)	DC RES.	INDUCTANCE @ CURRENT 1000 (%)	REPLACEMENT DATA: TRAV-LER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L24	.240A	49Ω	1 Hy.	FC-8A						

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: TRAV-LER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	Vert. Output	TR-50B	26S14	V319			DY-37A ①②③	26S14	A-160X
T2	Yoke-Horiz. (18.7MH) (110°)-Vert. (13.5MH)	L-149B	T-53 ①②③	T-110 ①②④				T-53 ①②③	Y-60 ② YC-110 ②③
	Rear Cover & Centering Device	MP-165							
	Yoke Clamp	ST-58							
T3	Horiz. Output	TR-31A	FLY-127*	HVO-152 *	KH63 *	RFR173 *	HO-304 *	FLY-127 *	D-151R *

① Use original rear cover, centering device, and yoke clamp.
② Use original yoke plug.
③ Connect as original.
④ Connect yoke terminal #2 to yoke plug pin #8, yoke #1 and #3 to plug #4, yoke #10 to plug #6.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	Ram Replacement Connections	Rogers Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
5	5	5	5	5	5	5	5 & 4
6	6	8	8	4	6	6	6
7	7	7	7	2	7	7	7
8	8	8	8	1	8	8	8
2	1	2	2	7	2	1	2
1	2	1	1	8	1	2	1
Special Notes				⑤			

⑤ Remove one turn from filament winding.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	SEC.	REPLACEMENT DATA: TRAV-LER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T4	3600Ω	3-4Ω	AT-51	24S53	A-3026	AU-506	A-3322	24S53	S-12X	

SPEAKER

ITEM No.	TYPE: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: TRAV-LER PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω	SPK-49	4A07	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	REPLACEMENT DATA: TRAV-LER PART No.
K1	Vert. Integrator	470mmf, 10000mmf, 15K, 15K	CC-120

RECTIFIERS

ITEM No.	RATING: CURRENT (Measured)	REPLACEMENT DATA: TRAV-LER PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.340A	SR-14 ①	SD500 ①	HF504 ①	40K ①	SR500 ①	① Silicon Type.
M2	240A	SR-14 ①	SD500 ①	HF504 ①	40K ①	SR500 ①	② Dual Sel. Diode
M3		SR-15 ②	SD61 ①②	K1615 ②			③ Two required.

CRYSTAL DIODES

ITEM No.	ORIG TYPE	REPLACEMENT DATA: TRAV-LER PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No	NOTES
M4	1N87	SC-23	1N87	1N87	1N80	Video Det (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	TRAV-LER PART No.	NOTES
M5	Tuner	TA-56	VHF with UHF provisions, Models 1790, 1790U
	Tuner	TA-60	VHF with UHF provisions, Models X1770, X1770U
	Tuner	TA-49	UHF, Models X1770U, 1790U
M6	Antenna	L-169	Telescopic, Models 1790, 1790U (JFD Repl. TA385)
	Antenna	L-148	Telescopic, Models X1770, X1770U (JFD Repl. TA377)

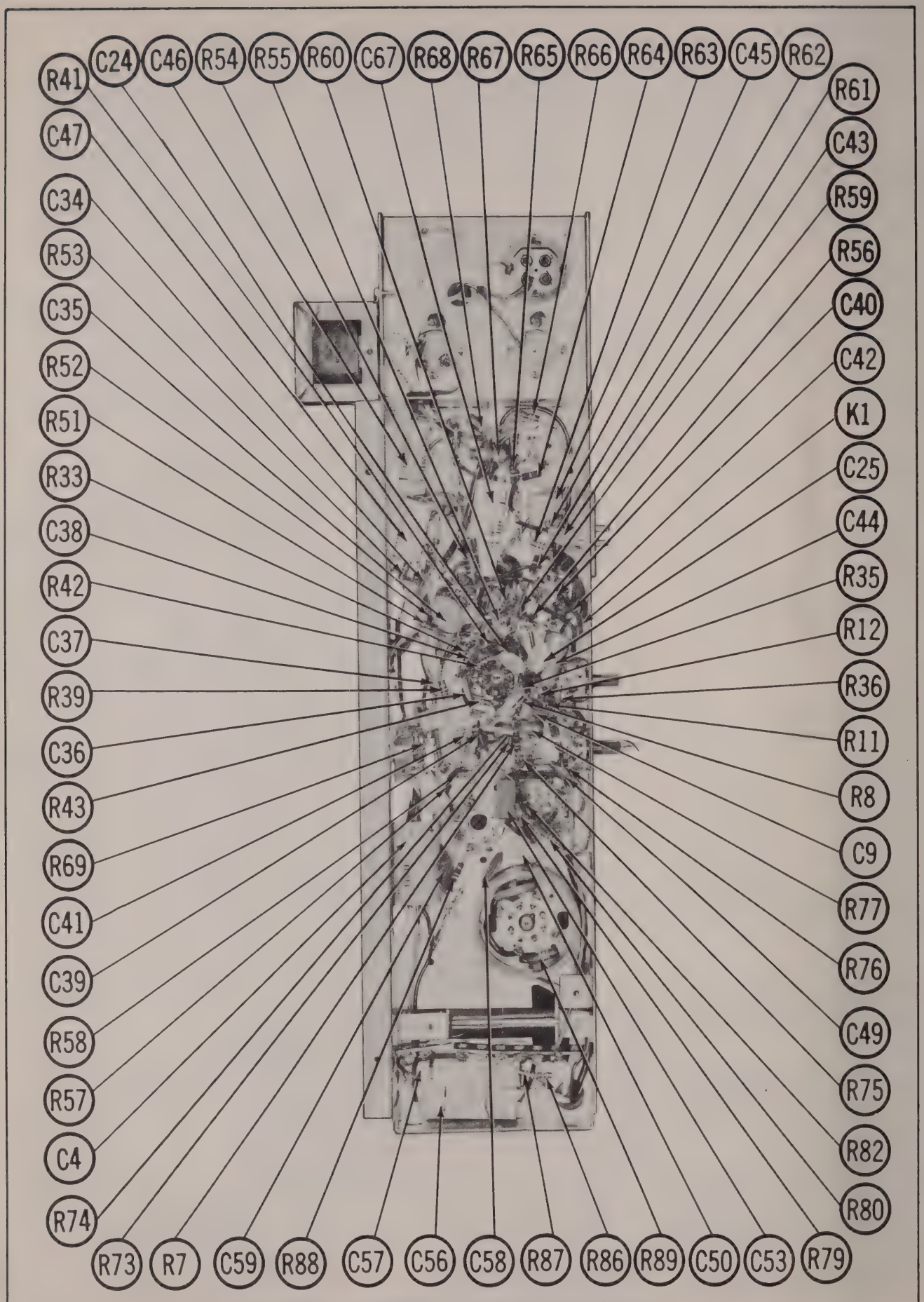
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO	DESCRIPTION
Safety Glass	MP-139	Models 1790, U
Safety Glass & Mask	MP-103	Models X1770, U
Knob	K-349	VHF Channel Selector, Models 1790, U
Knob	K-351	VHF Channel Selector, Models X1770, U
Knob	K-369	UHF Channel Selector, Models X1770U, 1790U
Knob	K-301	Fine Tuning, Models X1770, X1770U
Knob	K-355	Fine Tuning, Models 1790, 1790U
Knob	K-370	UHF Channel Indicator, Models X1770U, 1790U
Knob	K-353	Off-On-Volume, Models X1770, U
Knob	K-355	Off-On-Volume, Models 1790, U
Knob	K-332	Contrast, Vert. Hold, Models X1770, U
Knob	K-354	Contrast, Vert. Hold, Models 1790, U
Handle	MS-129	Models X1770, U
Handle	CH-115	Models 1790, U

WIRING DATA

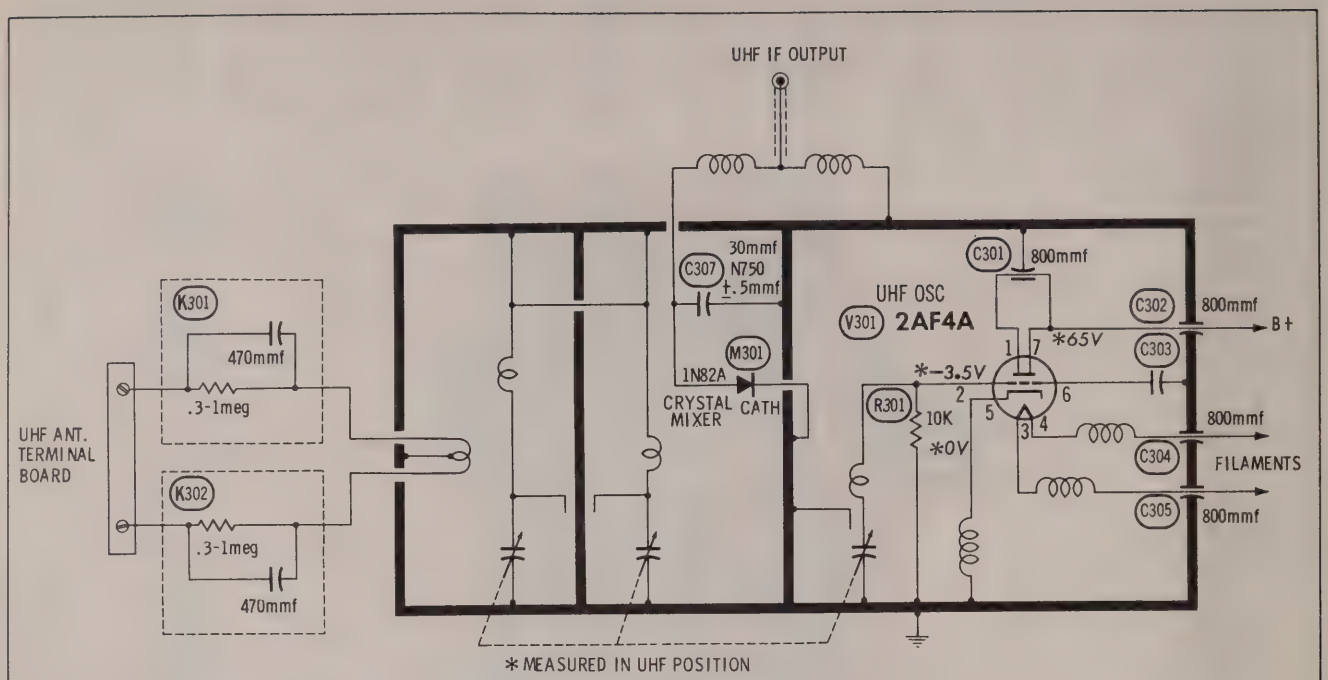
High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8674
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-In	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8486 (Round) - 5 Conductor 8488 (Round) - 8 Conductor



LOWER CHASSIS - BOTTOM VIEW

T
K201
C201
K202
MIXER PLATE COIL
C213
C218
C217
C202
A216 THRU A227
C306
A201 THRU A212
C215
C214
R208
C209
C210
R202
C211
C219
C208
C207
C206
A215
C205
C203
R201
C204
R204
R203
U
A213
C212
A214
C216
R205
R207
R206

TUNER TA-50



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TUBES

ITEM No.	CBS USE	CBS TYPE	GENERAL ELECTRIC USE	GENERAL ELECTRIC TYPE	RAYTHEON USE	RAYTHEON TYPE	SYLVANIA USE	SYLVANIA TYPE
V301	UHF Osc.	2AF4A						

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C301	800		EF-001	MFT-1000		CCF-102	CT280A	
C302	800		EF-001	MFT-1000		CCF-102	CT280A	
C303								
C304	800		EF-001	MFT-1000		CCF-102	CT280A	
C305	800		EF-001	MFT-1000		CCF-102	CT280A	
C306	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	10TS-D10
C307	30 N750 .5mmf							

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	TRAV-LER PART No.	NOTES
R301	10K			

ITEM No.	RATING OHMS	RATING WATT	PART No.	NOTES

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	TRAV-LER PART No.	REPLACEMENT DATA	
K301	UHF Antenna Isolation	470mmf, .3-1meg		Centralab Sprague	RC-471 AC1-1
K302	UHF Antenna Isolation	470mmf, .3-1meg		Centralab Sprague	RC-471 AC1-1

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: TRAV-LER PART No.	CBS PART No.	SYLVANIA PART No.	NOTES
M301	1N82A		1N82A	1N82A	UHF Mixer (Clip-in)

C207
R205
U
R204
L208
C203
R201
L203
C205
L205
A213
C210
A214
C212
C218
R208
L206
L207
C215
R202
R203
C214
C208
C209
C213
R207
R206
C216
C206
A215
C219
C217
MIXER PLATE COIL
L201
L202
T
C204
C202
A216
THRU
A227
K201
C201
K202
L204
C211
A201
THRU
A212

TUNER TA-56

TUNER PARTS LIST AND DESCRIPTIONS

TA-56

TUBES

ITEM No.	USE	TYPE
V201	RF Amplifier	2BN4A

ITEM No.	USE	TYPE
R202	Mixer-Osc.	5CA8

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C201	120 N750 10%			TCZ-120	C10T12U	CCTN-121	CN7-312	10TCU-T12
C202	30	#13M350U300N-02						
C203A	15 N150 7%	#13L8PG15N2				* *		10TCP-Q15
B	15 N150 7%					* *		10TCP-Q15
C204	1000		EF-001	MFT-1000		CCF-102	CT280A	
C205	2-10	#31B-902-09		829-10				
C206	.27 10%	#13D-111-45						
C207	2-6			829-6		VC-3	CT552	
C208	1.0 10%		NPO-SI 1.0	TCZ-1			CNO-510	10TCC-V10
C209	51 N750 10%	(31MMF-N470)*		TCN-51		CCTN-470		
C210	2-6			829-6		VC-3	CT522	
C211	30 5%	#13M350U300J-01						
C212	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C213	13 N220 5%	#13L8R130J				* *		10TCR-Q12
C214	4.7 N220 ±.25mmf	#13L8R4R7C				* *		10TCR-V47
C215	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C216	47	#13M130U470J01		MFT-50				
C217	1000		EF-001	MFT-1000		CCF-102	CT280A	
C218	1000		BPD-001	DD-001	BYA10D1	CCD-102	B-210	5HK-D10
C219	1000		EF-001	MFT-1000		CCF-102	CT280A	

"Standard Coil" Part Number.
* Alternate Value
** Not normally in distributor's stock. Available thru distributor on order to manufacturer.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R201	4700Ω	
R202	1000Ω	
R203	15K	(5600Ω) *

ITEM No.	RATING	REMARKS
R204	100K	
R205	220K	
R206	10K	

ITEM No.	RATING	REMARKS
R207	10K	
R208	1000Ω	

* Alternate Value

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	PART No.	REPLACEMENT DATA	
K201	Antenna Filter	470mmf, .5-1meg	13P-195	Centralab Sprague	RC-471 AC1-1
K202	Antenna Filter	470mmf, .5-1meg	13P-195	Centralab Sprague	RC-471 AC1-1

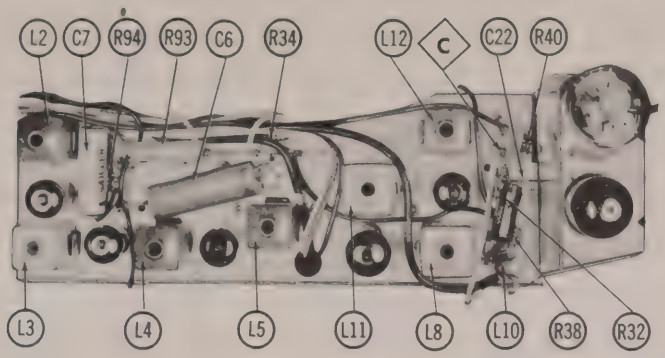
Note : Part numbers listed ablve are "Standard Coil" Part numbers.

COILS (RF-IF)

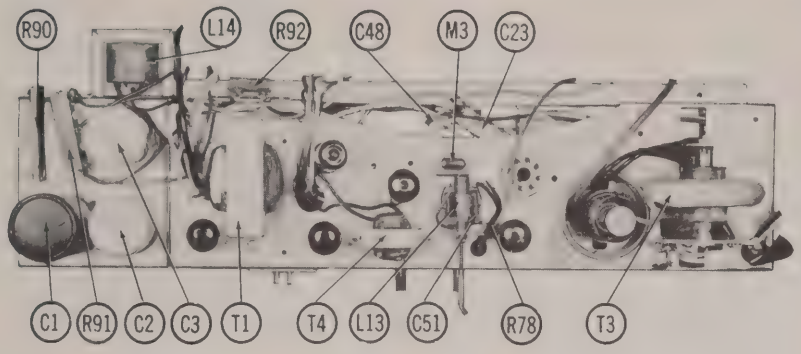
ITEM No.	USE	PART No.	NOTES
L201	Ant. Trans.	31T-3397	
L202	RF Choke	34A-748	
L203	IF Trap Coil	34A-762	
L204	Ant., RF, Mixer Grid & Osc. Coils	31T-3454-034-000	Channel 2-13 Includes Rotor & Coil Assy.

ITEM No.	USE	PART No.	NOTES
L205	RF Choke	34A-1005	
L206	Fine Tuning Coil	34A-787-03	
L207	Mixer Plate Coil	31UA-580-017	
L208	Fil. Choke	31K-137-027	

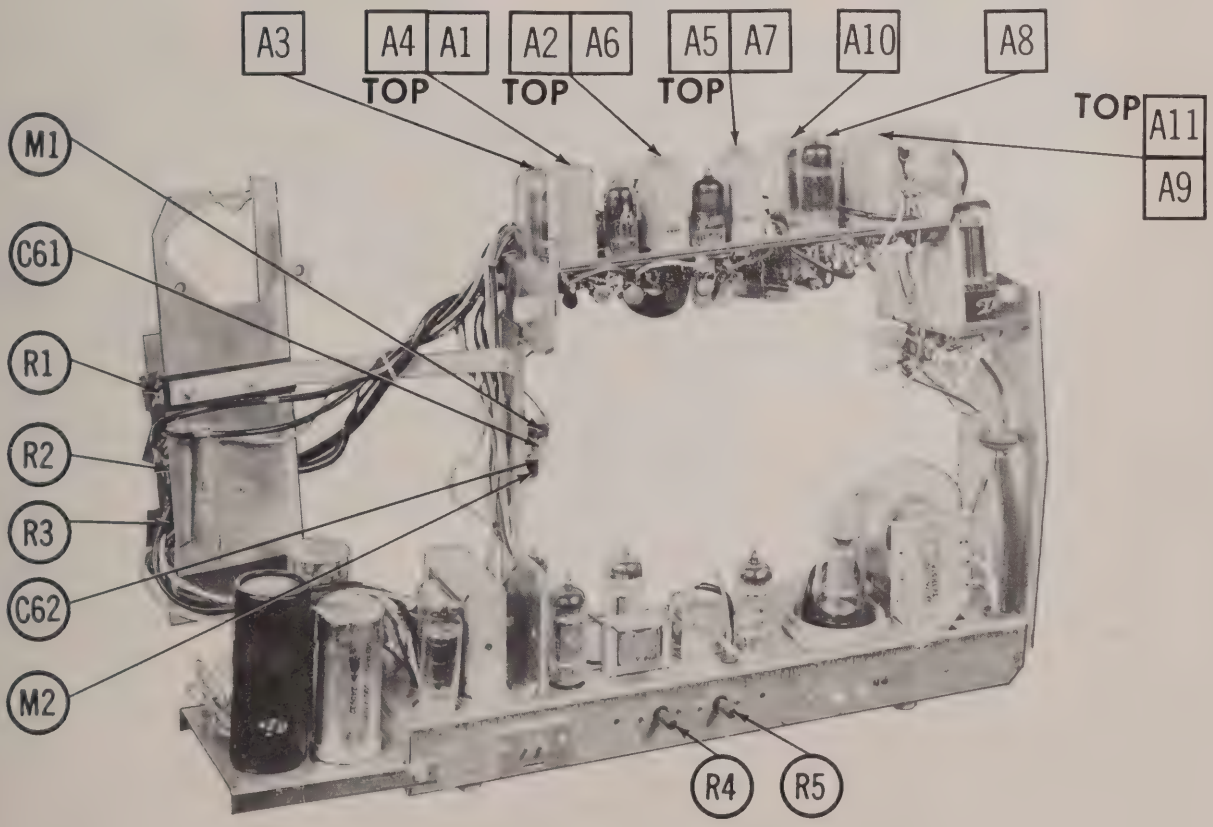
Note: Part numbers listed above are "Standard Coil" Part numbers.



UPPER CHASSIS - TOP VIEW



LOWER CHASSIS - TOP VIEW



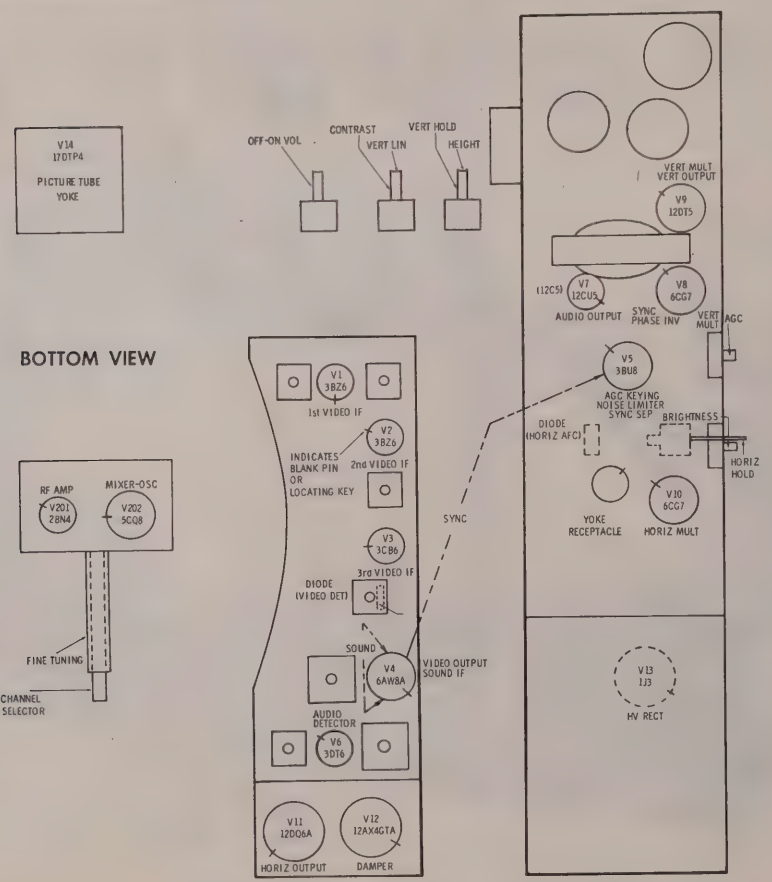
CHASSIS - REAR VIEW

RESISTANCE MEASUREMENTS

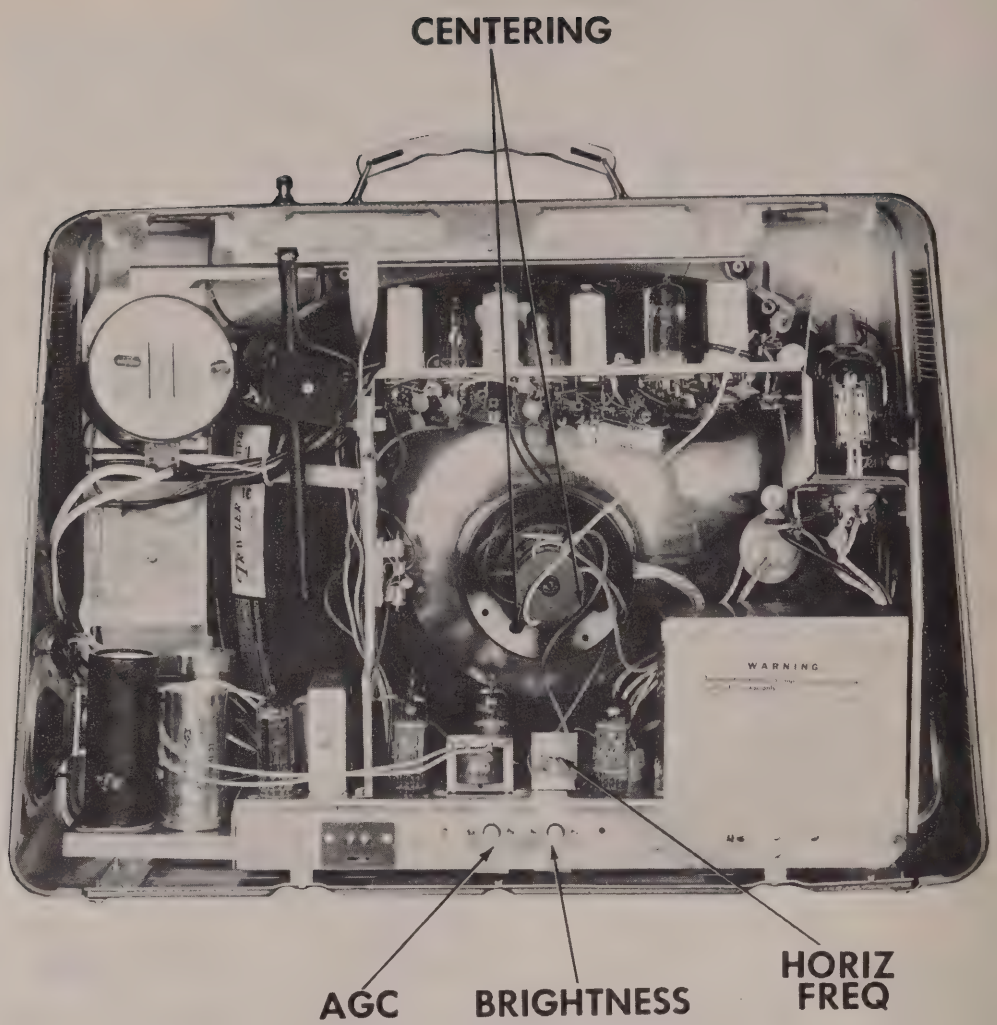
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3BZ6	140K	47Ω	6.5Ω	6Ω	▲ 470Ω	▲ 470Ω	0Ω		
V2	3BZ6	▲ 22K	▲ 68Ω	6Ω	5.5Ω	† 470Ω	† 470Ω	120K		
V3	3CB6	.1Ω	150Ω	5.5Ω	5Ω	■ 470Ω	■ 470Ω	0Ω		
V4	6AW8A	0Ω	100K	■ 100K	3.5Ω	5Ω	● 45Ω	6900Ω	■ 1200Ω	† 7500Ω
V5	3BU8	■ 0Ω	† 8200Ω	2.3meg	14Ω	13Ω	† 35K	† 390K	† 40K	■ 4.7meg
V6	3DT6	18.5Ω	680Ω	3.5Ω	2.5Ω	† 330K	■ 8200Ω	560K		
V7	12CU5/ 12C5	¶	550K	13Ω	10.5Ω	550K	† 220Ω	† 450Ω		
V8	6CG7	● † 1.2meg	220K	● 110K	9Ω	10.5Ω	† 12K	2meg	3300Ω	0Ω
V9	12DT5	† 100Ω	NC	2.2meg	9Ω	6.5Ω	2.2meg	● 650Ω	NC	† 375Ω
V10	6CG7	† 9200Ω	2.8meg	1500Ω	14Ω	15.5Ω	† 100K	56K	1500Ω	0Ω
V11	12DQ6A	NC	15.5Ω	NC	† 12K	470K	TP	18Ω	0Ω	TOP CAP ‡ 9Ω
V12	12AX4GTA	NC	NC	¶ 700K	NC	† 0Ω	NC	21Ω	18Ω	
V13	1J3	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP ‡ 470Ω
V14	17DTP4	2.5Ω	39K	‡ 150K	† 0Ω	NC	39K	● 120K	1.5Ω	
V201	2BN4	0Ω	3.7meg	0Ω	.5Ω	■ 1300Ω	0Ω	3.7meg		
V202	5CG8	10K	■ 5900Ω	0Ω	1.5Ω	.5Ω	■ 1300Ω	■ 10K	0Ω	320K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
● THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
▲ MEASURED FROM PIN 7 OF V2.
■ MEASURED FROM 150V SOURCE.
† MEASURED FROM 270V SOURCE
‡ MEASURED FROM PIN 3 OF V12.

NC NO CONNECTION.
TP TIE POINT.



TUBE PLACEMENT CHART



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Set the Brightness and Contrast controls for a normal picture.

Turn the Horizontal Frequency (Hold) clockwise until the picture loses sync. It may be necessary to switch off channel and back again for picture to lose sync.

Turn the Horizontal Frequency slowly counterclockwise until the picture just falls into sync.

PHOTOFACT* Folder with CIRCUITRACE*

EIA MEMBER

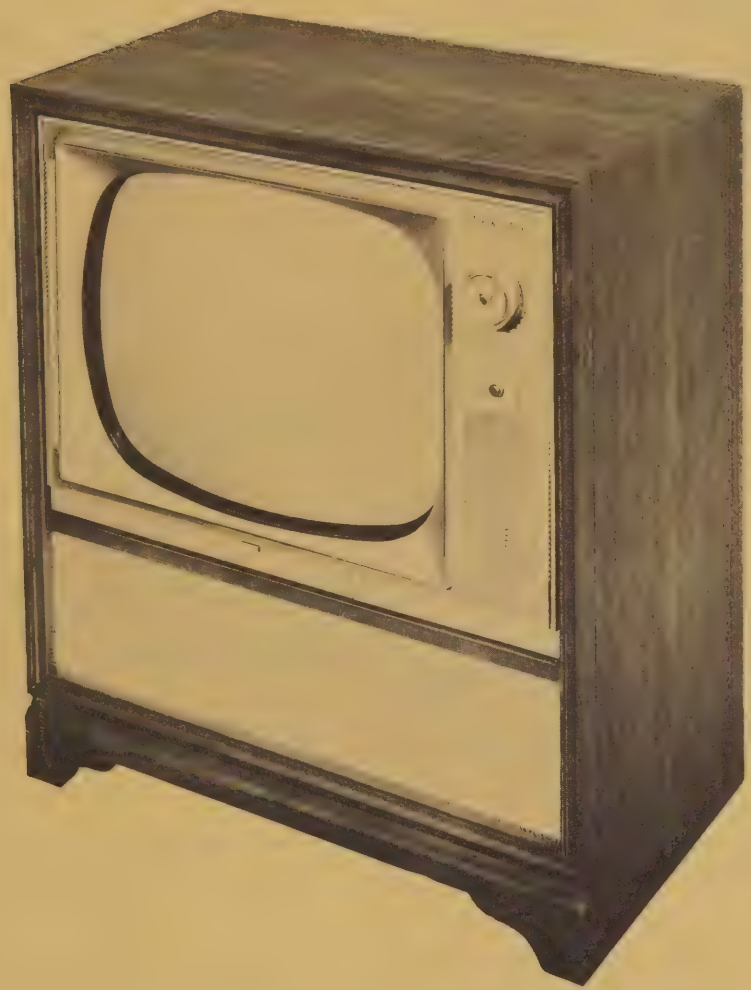
ZENITH CHASSIS 16D21, Q, U

IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

ZENITH CHASSIS
16D21, Q, U



MODEL D2348W (Ch. 16D21)

ZENITH CHASSIS
16D21, Q, U

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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SET 467 FOLDER 2

PHOTOFACT* Folder with CIRCUITRACE*

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

ZENITH CHASSIS 16D21, Q, U

ZENITH CHASSIS 16D21, Q, U

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 8 push-on type knobs from front of cabinet.
2. Remove 8 wood screws and one metal screw holding rear cover. Remove rear cover.
3. Remove speaker leads and 2 metal screws holding external speaker socket.
4. Remove 2 bolts holding tuner mounting bracket at rear of cabinet. Remove pilot lamp lead.
5. Remove 2 metal screws holding On-Off-Volume control mounting bracket.
6. Remove 4 chassis bolts from bottom of chassis.
7. Remove chassis.

MODEL D2348W (Ch. 16D21)

TRADE NAME	Zenith	MODELS	CHASSIS
		D2301R, Y, D2302R, D2315L, R, Y, D2317E, R, W, D2345E, R, W, D2347E, L, M, R, W, D2348E, R, W, D2350H, M, R, W, D2355E, L, R, W, D2381E, R, W, D2384H, R, D2673E, R, W	16D21
		D2301RU, YU, D2302RU, D2315LU, RU, YU, D2317EU, RU, WU, D2345EU, RU, WU, D2347EU, LU, MU, RU, WU, D2348EU, RU, WU, D2350HU, MU, RU, WU, D2355EU, LU, RU, WU, D2381EU, RU, WU, D2384HU, RU, D2673EU, RU, WU	16D21U
		D3002E, R, W, D3004E, R, W, D3005E, L, M, R, W, D3006E, L, R, W, D3007E, M, R, W, Y, D3008R, D3009E, W, Y	16D21Q

MANUFACTURER	Zenith Radio Corp., 6001 Dickens Avenue, Chicago 39, Illinois
TYPE SET	Television Receiver
TUBES	VHF-Sixteen (Ch. 16D21)
POWER SUPPLY	110-120 Volts AC, 60 Cycle RATING 195 Watts, 1.8 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

Remove 3 push-on type knobs from the front. Remove 2 screws holding trim and 4 metal screws holding front glass. Tilt glass out and remove.

FUSE

One fuse is used for low voltage power supply protection. (For location, see "Tube Placement Chart".)
One fuse wire is used for filament protection. (For location, see M3 in photo "Chassis Bottom View".)

TUNER OSCILLATOR ADJUSTMENTS

To touch-up the VHF Oscillator, remove Channel Selector and Fine Tuning knobs.

AGC

The AGC may be varied by means of an AGC control. (For location, see "Tube Placement Chart".)

FOCUS

The focus may be varied by means of a Focus control. (For location, see "Tube Placement Chart".)

SYNC STABILITY

Sync stability may be varied by means of a Fringe Lock control. (For location, see "Tube Placement Chart".)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

The Horizontal Frequency slug is used for the Horizontal Hold. (For location, see "Tube Placement Chart".)

WIDTH

The width may be varied by adjusting a metallic sleeve, located between the yoke and the picture tube neck, in or out of the yoke.

BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Buzz control for MINIMUM buzz and maximum sound. (For location, see "Tube Placement Chart".)

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

PINCUSHION CORRECTION

Reduce the picture size so that the sides of the raster are visible. Position the 2 magnets so that all sides are straight.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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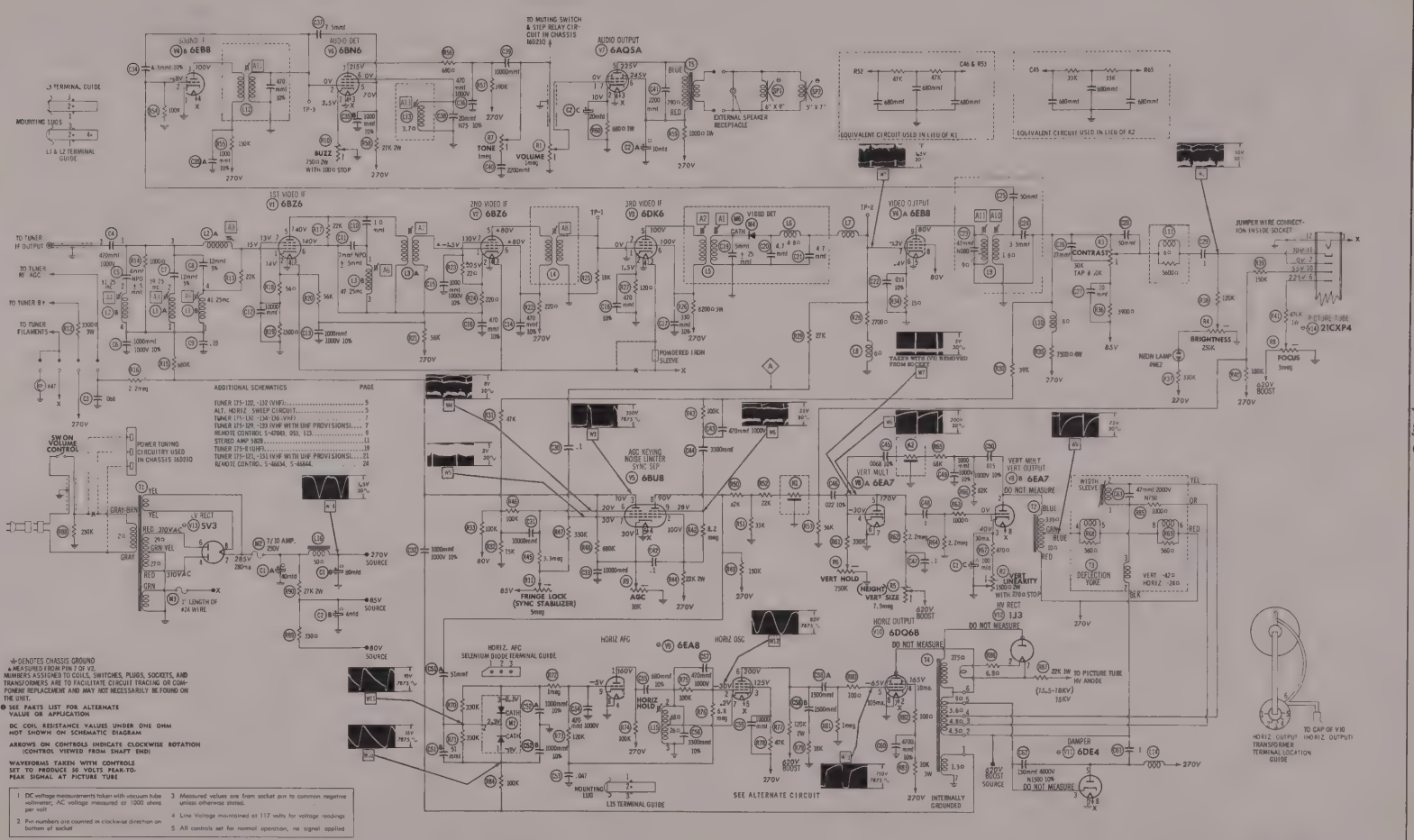
JA646

ZENITH CHASSIS 16D21, Q, U

SET 467 FOLDER 2



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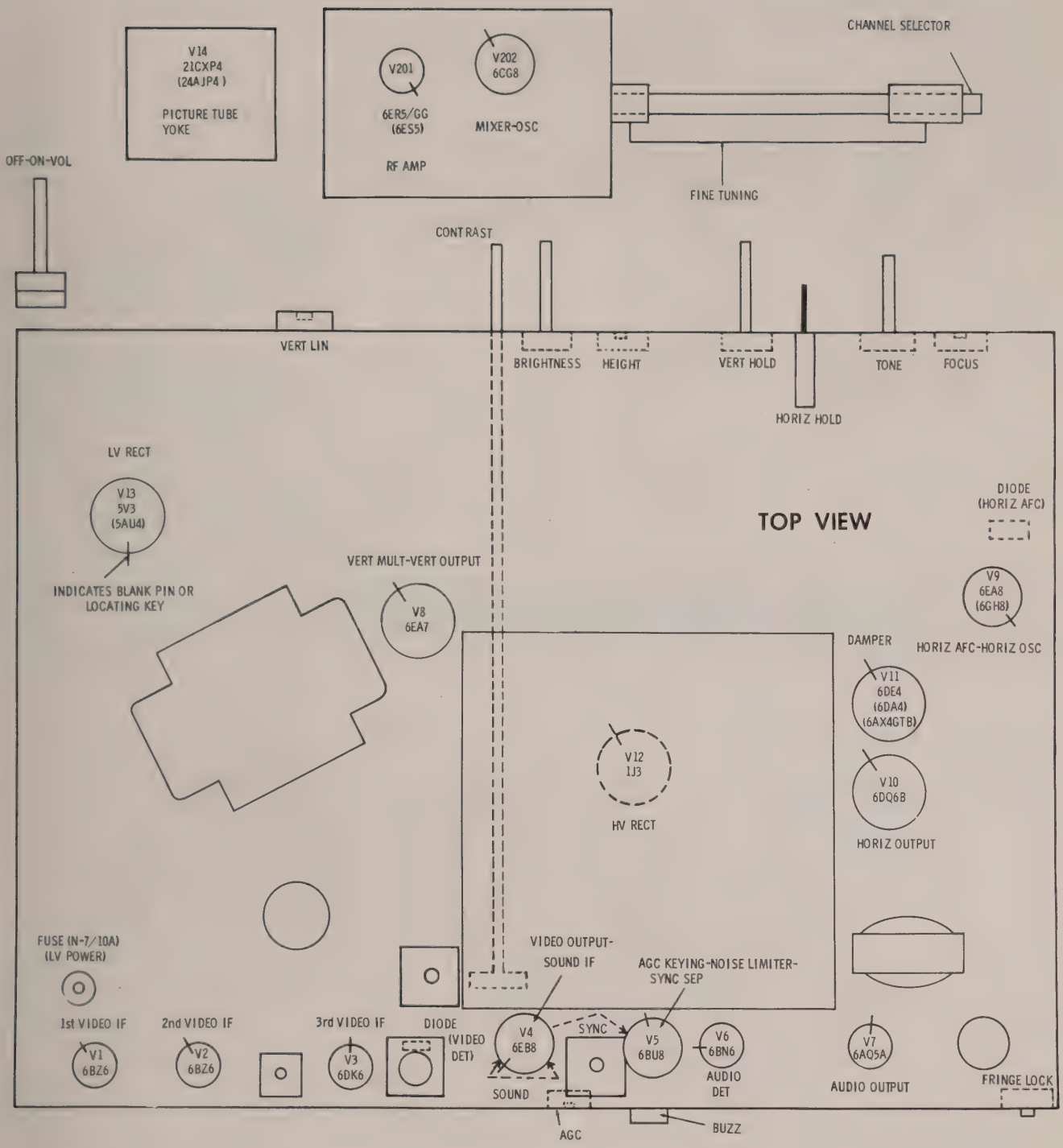
ZENITH CHASSIS
16D21, Q, U

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound Fuse (LV Power), V13

SWEEP FAILURE
No raster, has sound V9, V10, V11, V12, V14
No vertical deflection V8
Poor vert. linearity or foldover V8
Poor horiz. linearity or foldover V9, V10, V11
Narrow picture V13, V9, V10, V11
Vert. off freq. V8
Horiz. off freq. Diode (Horiz. AFC), V9

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, V4,
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V4, V14
Has pic, no sound V6, V7
Overloaded picture V5

SYNC FAILURE
No vert. sync V5
No horiz. sync V5, V9, Diode (Horiz. AFC)
No vert. or horiz. sync V5

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested alignment tools: A1 thru A13.... General Cement #8606, 8606L, 8682, 9295
Walsco #2526, 2543, 2544, 2545

VIDEO IF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	470mmf	High side to TP1. Low side to chassis. Connect a 56Ω carbon resistor across sweep output.	44MC (10MC Swp)	39.75MC 41.25MC 45.75MC	Between any two channels	Vert. Amp. thru 10K to TP2. Low side to chassis. (Across Video Det. load)	A1, A2	Set sweep generator output to produce 3 volts peak to peak on scope. Adjust A1 and A2 alternately for maximum gain and symmetry with the 45.75MC marker positioned as shown in Fig. 1. The 39.75MC marker can fall within ±.5MC of the specified frequency. If the desired response cannot be obtained, check to see that the cores are entering their respective windings from opposite ends of the coils.
2.	Direct	High side to ungrounded tube shield floating over Mixer-Osc. tube (V202). Low side to chassis.	"	39.75MC 41.25MC 47.25MC	"	"	A3, A4, A5, A6	Connect a clip lead from point Ⓐ to chassis. Connect a clip lead from TP3 to point Ⓑ. Use high scope again and adjust A3 thru A6 for MINIMUM marker amplitudes as in Fig. 2. A3 controls the 39.75MC marker, A4 controls the 41.25MC marker and A5 and A6 control the 47.25MC marker.
3.	"	"	"	41.25MC 42.75MC 45.0MC 45.75MC	"	"	A7, A8, A9, & Mixer Plate Coil	Remove clip lead from point Ⓑ and connect to chassis. Adjust for maximum gain and symmetry of response similar to Fig. 3 with markers as shown. A7 affects low side of curve and A8 affects the high side. Remove clip leads.

SOUND IF ALIGNMENT

Connect an adjustable attenuator between the antenna and the receiver antenna terminals. Tune in a TV station and adjust the attenuator until the signal is below the limiting level of the 6BN6 as evidenced by a hiss similar to super-regeneration in the sound. Adjust A10, A11, A12 and A13 for maximum sound and best quality. Adjust the Buzz control (R10) for MINIMUM buzz. If the hiss disappears during alignment, further reduce the signal until the hiss returns.

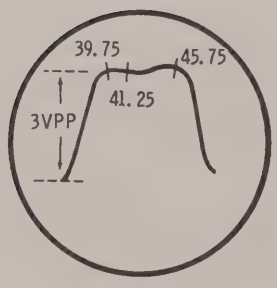


FIG. 1

FIG. 2

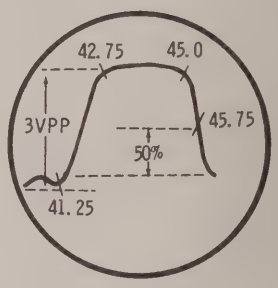
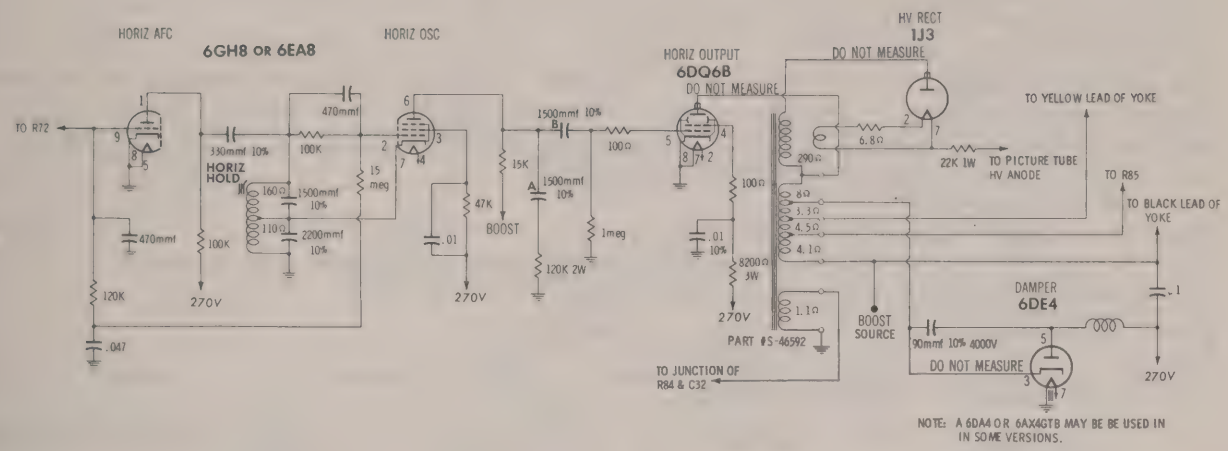


FIG. 3

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGES 6, 23



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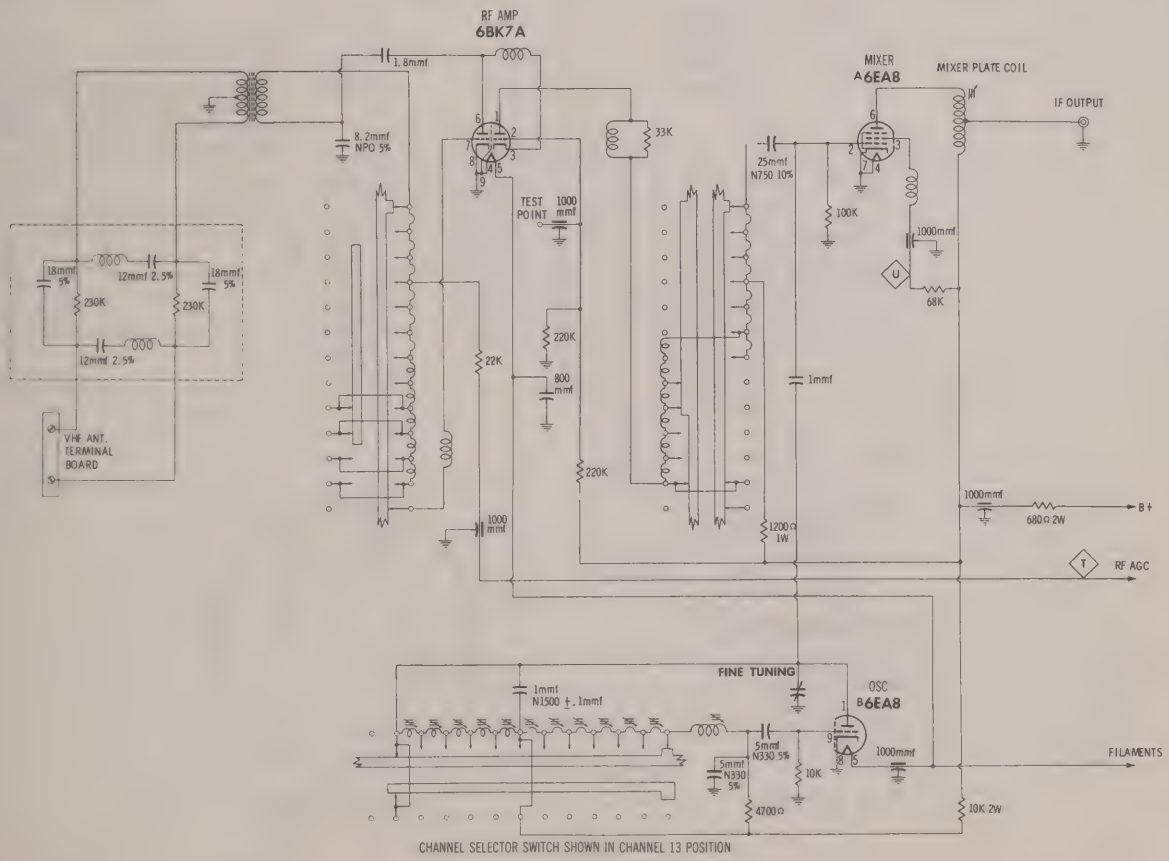
ALTERNATE HORIZONTAL SWEEP CIRCUIT



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VHF TUNER 175-122, -132

ZENITH CHASSIS 16D21, Q, U

FOLDER 2

TUNER ALIGNMENT INSTRUCTIONS

175-129, -130, -133, -134, -136, -140

PRE-ALIGNMENT INSTRUCTIONS

Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested alignment tools: GENERAL CEMENT
WALSCO

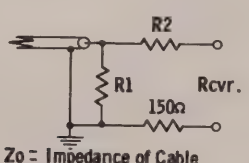
VHF OSCILLATOR ALIGNMENT

Set the Fine Tuning to the center of its range by turning the Fine Tuning shaft until the small index hole in the drive cam is directly over the small hole just below the channel 13 oscillator adjustment screw. Starting with the highest channel operating in the area, adjust the appropriate oscillator adjustment screw for best picture and sound for each channel available.

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 2 volt bias supply to point ⓣ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usuable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Fig. 201	Across antenna terminals thru matching network (Fig. 201).	213MC	211.25MC 215.75MC	13	Vert. amp. thru 10K to point ⓤ. Low side to chassis.	A201	Adjust for maximum gain and symmetry of response similar to Fig. 202 with markers as shown.
2.	"	"	207MC	205.25MC 209.75MC	12	"	A202	"
3.	"	"	201MC	199.25MC 203.75MC	11	"	A203	"
4.	"	"	195MC	193.25MC 197.75MC	10	"	A204	"
5.	"	"	189MC	187.25MC 191.75MC	9	"	A205	"
6.	"	"	183MC	181.25MC 185.75MC	8	"	A206	"
7.	"	"	177MC	175.25MC 179.75MC	7	"	A207	"
8.	"	"	85MC	83.25MC 87.75MC	6	"	A208, A209	Adjust for maximum gain and symmetry of response similar to Fig. 202 with markers as shown. Adjust first coil for proper marker position and second coil for maximum gain and symmetry.
9.	"	"	79MC	77.25MC 81.75MC	5	"	A210, A211	"
10.	"	"	69MC	67.25MC 71.75MC	4	"	A212, A213	"
11.	"	"	63MC	61.25MC 65.75MC	3	"	A214, A215	"
12.	"	"	57MC	55.25MC 59.75MC	2	"	A216, A217	"



Zo = Impedance of Cable

Zo	R1	R2
50Ω	56Ω	120Ω
75Ω	82Ω	110Ω

FIG. 201

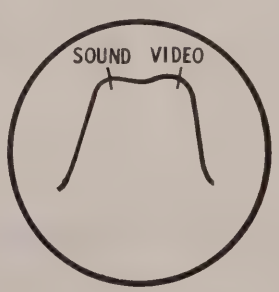
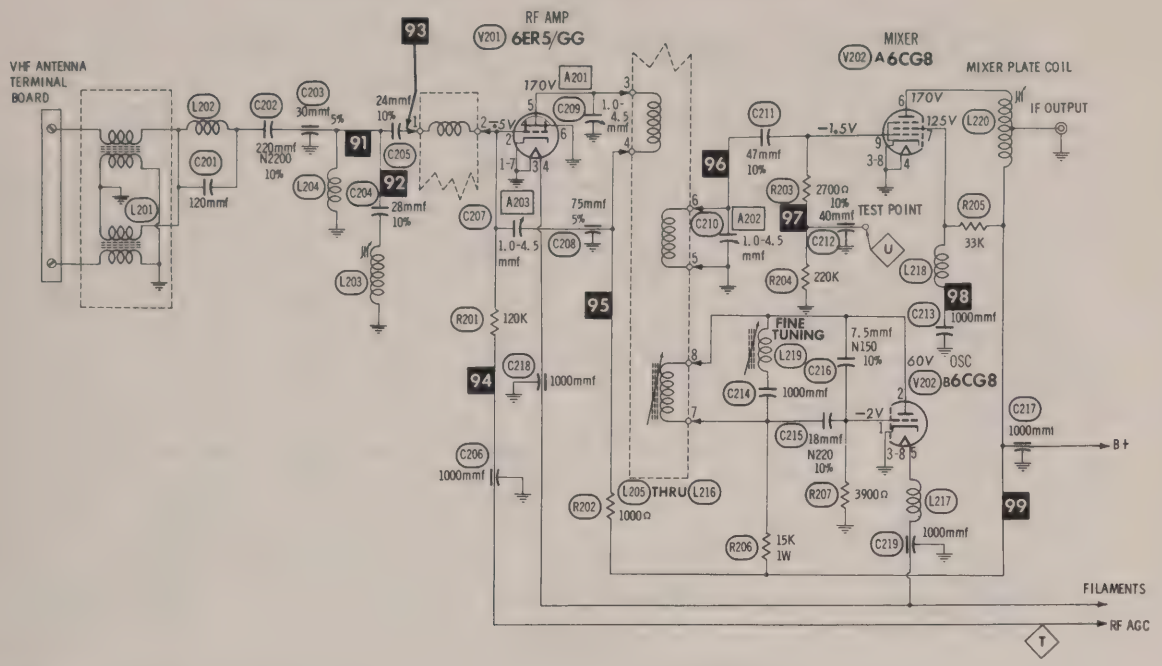


FIG. 202



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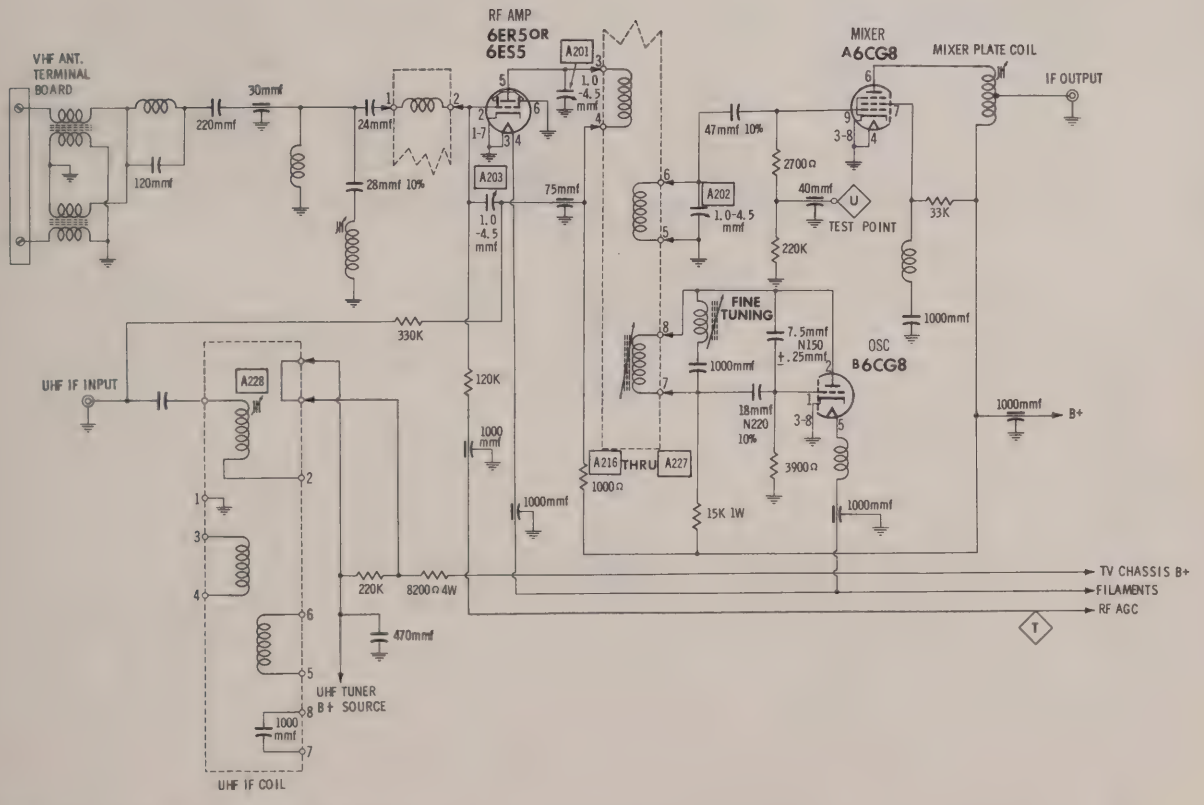
VHF TUNER 175-130, -134, -136



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VHF TUNER WITH UHF PROVISIONS 175-129, -133

TUNER
175-130
PARTS LIST AND DESCRIPTIONS
TUBES

• CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA •					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V201	RF Amplifier	6ER5/GG(6ES5) *	V202	Mixer-Osc.	6CG8

* Alternate

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C201	120 N2200 10%	#22-3060				*		
C202	220		DI-220	DD-221	L10T22	CCD-221	GP322	10TS-T22
C203	30 5%	#22-3111						
C204	28 10%		NPO-DI 25	TCZ-27	C10Q27C	CCD-270	GP429	10TS-Q27
C205	24		NPO-DI 25	DTZ-25	C10Q24C	CCD-250	GP425	10TS-Q25
C206	1000		EF-001	MFT-1000		CCF-102	CT280A	
C207	1-4.5	#22-3148		829-6				
C208	75	#22-3147						
C209	1-4.5	#22-3148		829-6				
C210	1-4.5	#22-3148		829-6				
C211	47 10%		NPO-DI 47	DTZ-47	C10Q47C	CCD-470	GP447	10TS-Q47
C212	40 10%	#22-3112						
C213	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C214	1000		BPD-001	DD-102	BYA10D1	CCD-102	GP210	5HK-D10
C215	18 N220 10%	#22-3025						10TCR-Q18
C216	7.5 N150 10%	#22-3026						10TCP-V82
C217	1000		EF-001	MFT-1000		CCF-102	CT280A	
C218	1000		EF-001	MFT-1000		CCF-102	CT280A	
C219	1000		EF-001	MFT-1000		CCF-102	CT280A	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
\# Zenith Part Number.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R201	120K	
R202	1000Ω	
R203	2700Ω	

ITEM No.	RATING	REMARKS
R204	220K	
R205	33K	
R206	15K 1W	

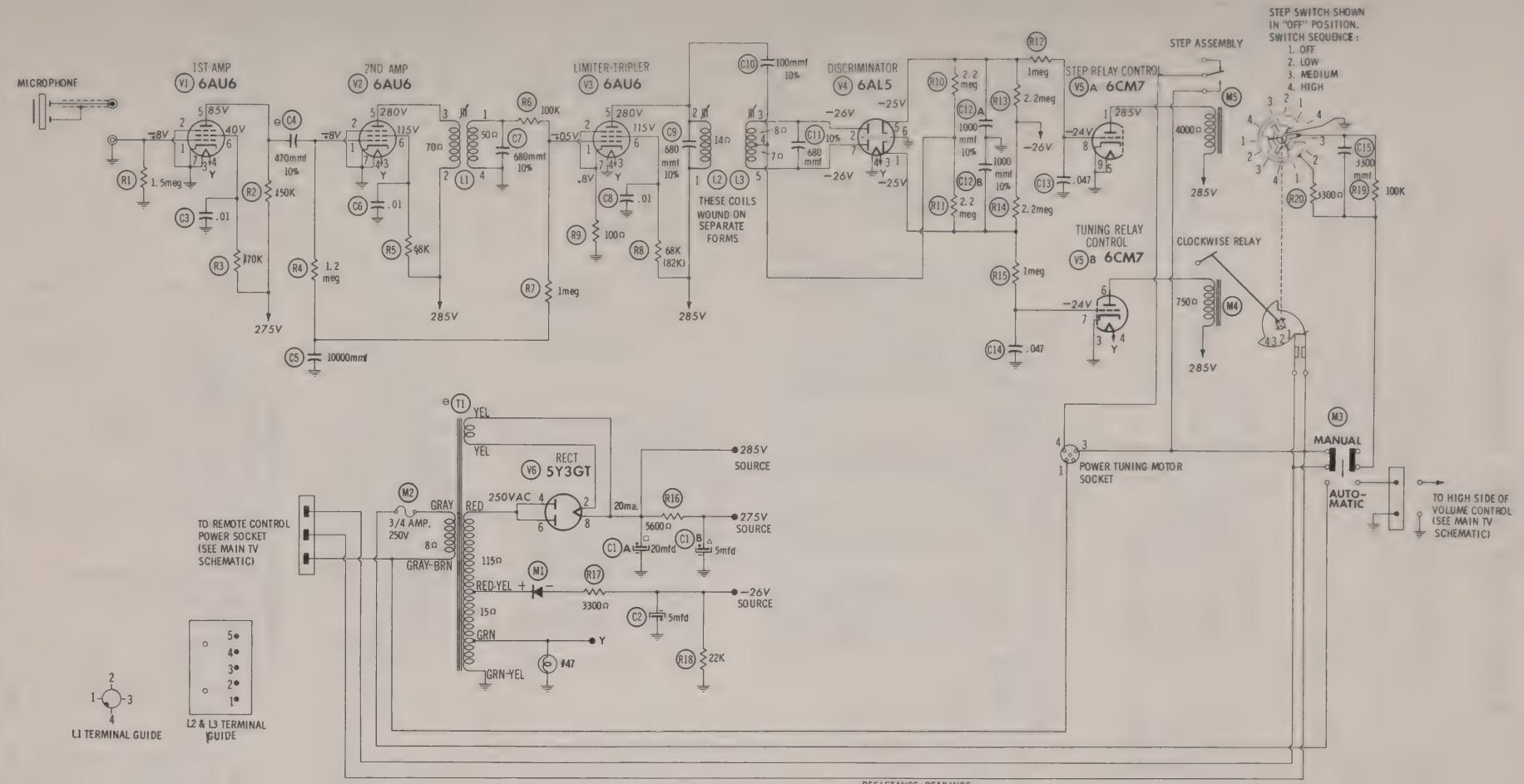
ITEM No.	RATING	REMARKS
R207	3900Ω	

COILS (RF-IF)

ITEM No.	USE	ZENITH PART No.	NOTES
L201	Ant. Trans. Assy.	S-47666	
L202	RF Choke	20-657 †	
L203	IF Trap Coil	S-40497	
L204	RF Choke	20-756	
L205	Ant., RF, Mixer Grid & Osc. Coils	174-2	Channel 2
L206	"	174-3	Channel 3
L207	"	174-4	Channel 4
L208	"	174-5	Channel 5
L209	"	174-6	Channel 6
L210	"	174-7	Channel 7

ITEM No.	USE	ZENITH PART No.	NOTES
L211	Ant., RF, Mixer Grid & Osc. Coils	174-8	Channel 8
L212	"	174-9	Channel 9
L213	"	174-10	Channel 10
L214	"	174-11	Channel 11
L215	"	174-12	Channel 12
L216	"	174-13	Channel 13
L217	Fil. Choke	20-734	
L218	RF Choke	20-721	
L219	Fine Tuning Coil	S-43559	Includes Assy.
L220	Mixer Plate Coil	S-45638	

† Part of L201.



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AU6	1.5meg	0Ω	.1Ω	0Ω	††155K	††475K			
V2	6AU6	2.3meg	0Ω	.1Ω	0Ω	††70Ω	††68K	0Ω		
V3	6AU6	100K	100Ω	.1Ω	0Ω	††14Ω	††68K	100Ω		
V4	6AL5	1.8meg	2.5meg	.1Ω	0Ω	1.8meg	0Ω	2.5meg		
V5	6CM7	††4000Ω	TP	0Ω	.1Ω	0Ω	††750Ω	3meg	3meg	0Ω
V6	5Y3GT	NC	¶	NC	130Ω	NC	130Ω	NC	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
†† MEASURED FROM PIN 8 OF V6.
NC NO CONNECTION
TP TIE POINT

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REMOTE CONTROL S-47043, S-47053, S-47113

ZENITH CHASSIS
16D21, Q, U

REMOTE CONTROL
S-47043
PARTS LIST AND DESCRIPTIONS

TUBES

• CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA •					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	1st RF Amp.	6AU6	V4	Discriminator	6AL5
V2	2nd RF Amp.	6AU6	V5	Step Relay Control-Tuning Relay Control	6CM7
V3	Limiter Trippler	6AU6	V6	Rectifier	5Y3GT

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	■20	350	22-3122	AFH2-50	B0390	FP231.3	TMD-49	TVL-2760	
B	▲5	350							
C2	5	50	22-3206	PRS1310	BBR5-50	TC30	TD-5-50	TVA-1303	Note 1

Note 1. Ch. S-47053 and S-47113 use 5mfd,50V (Part #22-2941).

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	.01 400V		P488N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S1
C4	470 10%		1469-00047	DD-471	5R5T47	CM-20B-471K	MCB245	MS-347
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C6	.01 400V		P488N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S1
C7	680 10%		1469-00068	DD-681	1R5T68	CM-20B-681K	MCJ249	MS-368
C8	.01 400V		P488N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S1
C9	680 10%		1469-00068	DD-681	1R5T68	CM-20B-681K	MCJ249	MS-368
C10	100 10%		1469-0001	DD-101	22R5T1	CM-20B-101K	MCB235	MS-310
C11	680 10%		1469-00068	DD-681	1R5T68	CM-20B-681K	MCJ249	MS-368
C12A	1000 10%	#22-21	DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
B	1000 10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
C13	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C14	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C15	3300		BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R1	1.5meg	
R2	150K	
R3	470K	
R4	1.2meg	
R5	68K	
R6	100K	
R7	1meg	

ITEM No.	RATING	REMARKS
R8	68K	(82K) *
R9	100Ω	
R10	2.2meg	
R11	2.2meg	
R12	1meg	
R13	2.2meg	
R14	2.2meg	

ITEM No.	RATING	REMARKS
R15	1meg	
R16	5600Ω	
R17	3300Ω	
R18	22K	
R19	100K	
R20	3300Ω	

* Alternate.

COILS (RF-IF)

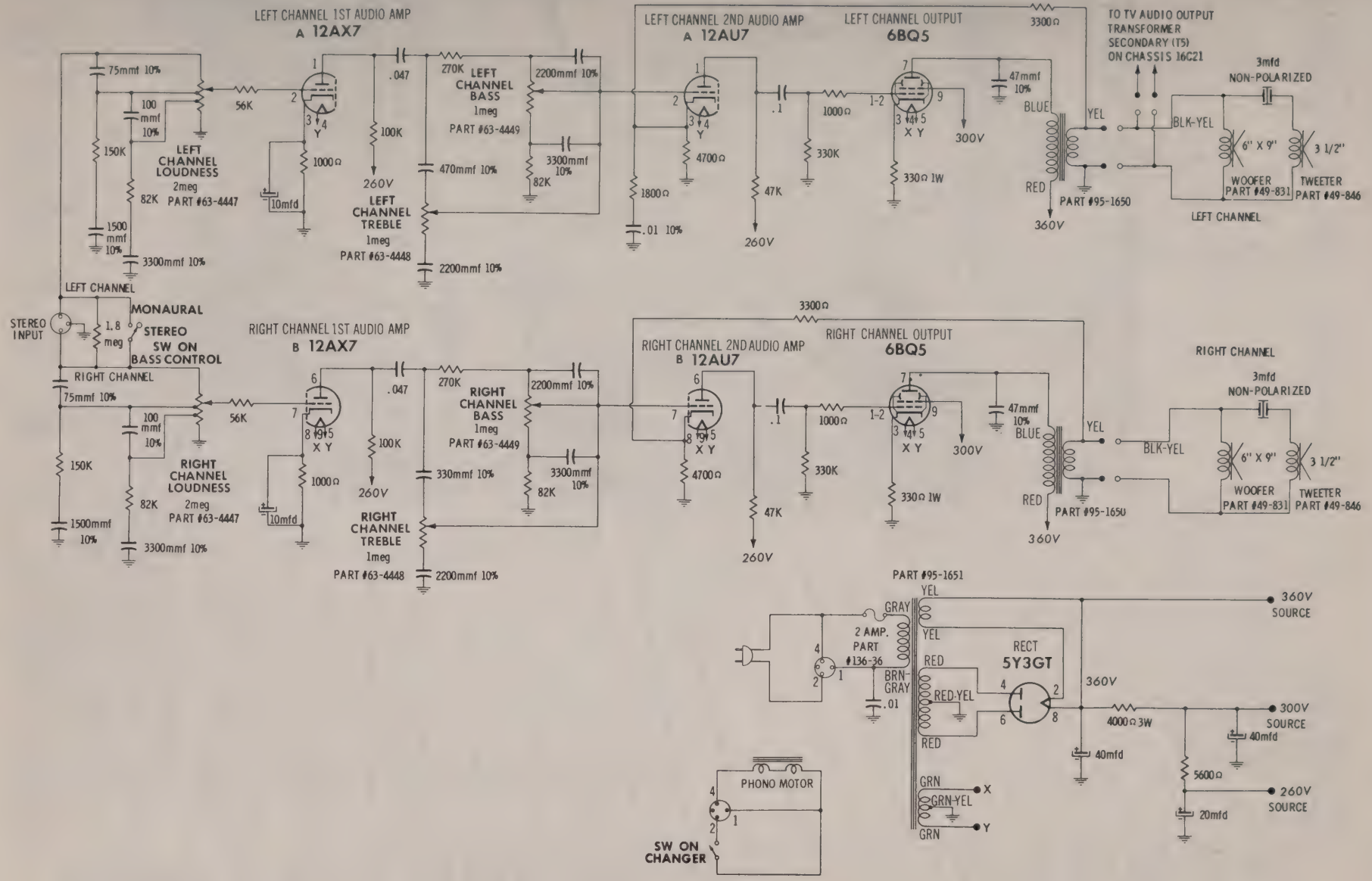
ITEM No.	USE	REPLACEMENT DATA						NOTES
		ZENITH PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	39.5KC Trans.	S-43725						
L2	Discriminator Pri.	S-24788						
L3	Discriminator Sec.	S-24789						

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .36A	250V @ .020A tap @ 40V @ .0015A tap @ 6.3V @ 1.7A	5V @ 2A	95-1697						
	117V @ .5A	220V @ .040A tap @ 3.2V @ .001A tap @ 6.3V @ 2.8A		95-1612 ①						

① Used in Models S-47113, S-47053.

continued PAGE 19



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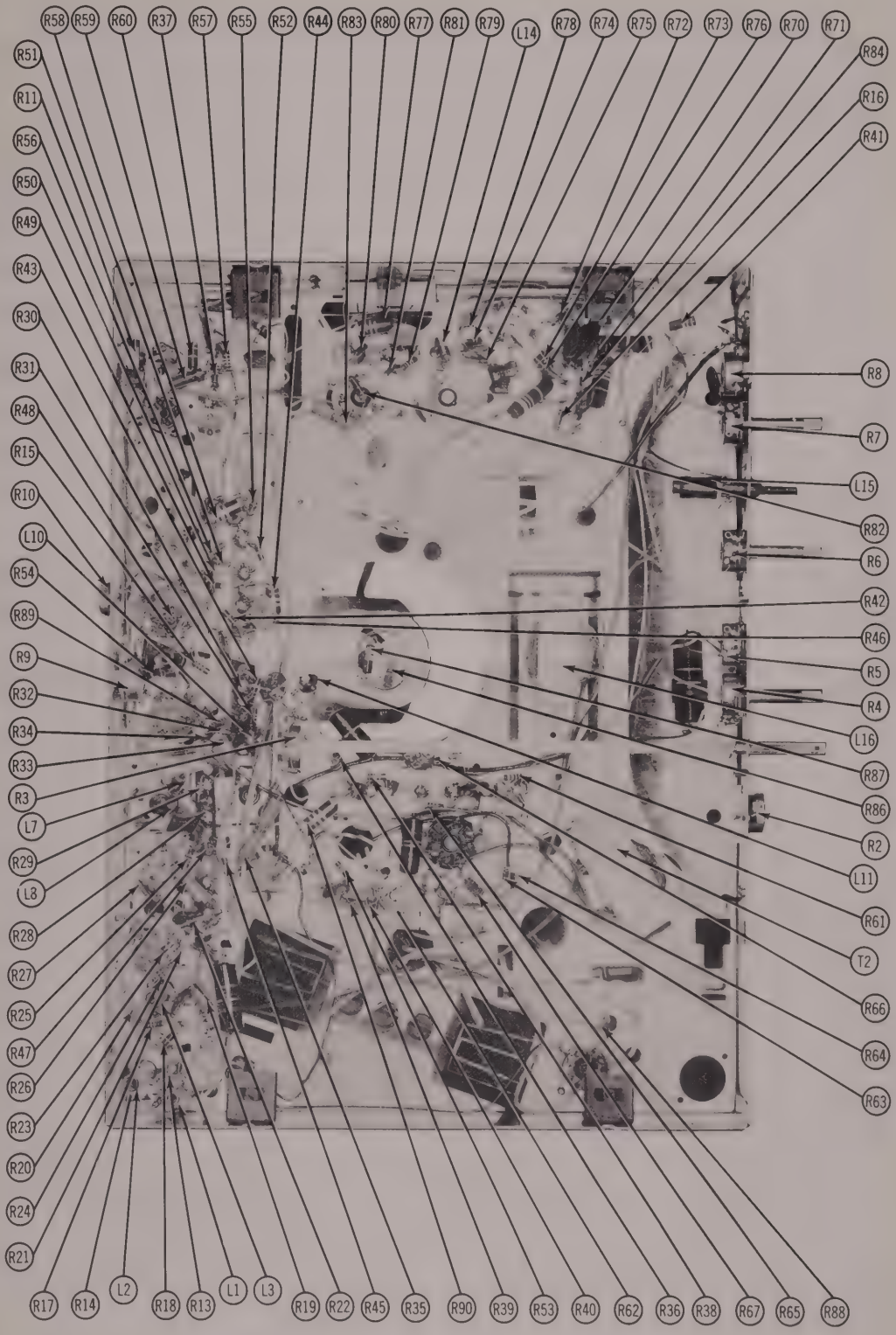
STEREO AMPLIFIER 5B28

ZENITH CHASSIS 16D21, Q, U



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

ZENITH CHASSIS
16D21, Q, U

PARTS LIST AND DESCRIPTIONS

TUBES

• CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA •					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	1st Video IF Amp.	6BZ6	V7	Audio Output	6AQ5A
V2	2nd Video IF Amp.	6BZ6	V8	Vert. Mult. - Vert. Output	6EA7
V3	3rd Video IF Amp.	6DK6	V9	Horiz. AFC-Horiz. Osc.	6EA8 (6GH8)*
V4	Video Output-Sound IF Amp.	6EB8	V10	Horiz. Output	6DQ6B
V5	AGC Keying-Noise Limiter-Sync Sep.	6BU8	V11	Damper	6DE4 (6DA4 or 6AX4GTB)*
V6	Audio Det.	6BN6	V12	HV Rect.	1J3
			V13	LV Rect.	5V3 (5AU4) *

* Alternate.

PICTURE TUBE

ITEM No.	REPLACEMENT DATA					NOTES
	ZENITH PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
V14	21CXP4 24AJP4	21CXP4 ①	21CXP4 ①	21CXP4 24AJP4	21CXP4 ② 24AJP4 ②	① Aluminized ② "Silver Screen 85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	■40	400	22-3137	AFH4-100-40	C0890	FP333.2	TMT-109	TVL-4663.4	
B	▲80	400							
C	▲100	50							
C2A	■10	400	22-2744	AFH3-180	C1445	FP332.7	TMT-217	TVL-3655	
B	▲4	350							
C	20	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	.068 200V		P288N-068		CUB4S68	4DP-3-683	GEM-4168	4TM-S68
C4	470 1000V		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C5	4 NPO ±.5mmf	#22-2549			C10V4C			
C6	1000 1000V 10%		DI-1000	DD-102		CCD-102	GP210	10TS-D10
C7	12 5%			TCZ-12	C10Q12C	CCTO-120	CNO-412	10TCC-Q12
C8	12 5%			TCZ-12	C10Q12C	CCTO-120	CNO-412	10TCC-Q12
C9	.15 200V		P288N-15		CUB2P15	2DP-3-154	GEM-2015	2TM-P15
C10	1.0		NPO-SI 1.0	TCZ-1	C10V15C		CNO-510	10TCC-V10
C11	7 NPO ±.5mmf		NPO-DI 6.8	TCZ-6R8	C10V7C	CCTO-6R8	CNO-568	10TCC-V68
C12	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C13	1000 1000V 10%		DI-1000	DD-102		CCD-102	GP210	10TS-D10
C14	470 10%		DI-470	DD-471	5R5T47	CCD-471	GP347	10TS-T47
C15	1000 1000V 10%		DI-1000	DD-102		CCD-102	GP210	10TS-D10
C16	470 10%		DI-470	DD-471	5R5T47	CCD-471	GP347	10TS-T47
C17	330 10%		1469-00033	DD-331	5R5T33	CM-20B-331-10%	MCB241	MS-333
C18	470 10%		DI-470	DD-471	5R5T47	CCD-471	GP347	10TS-T47
C19	5 ±.25mmf		NPO-DI 5.0	DTZ-4R7	C10V5C		CNO-547	10TCC-V50
C20	4.7		NPO-SI 4.7	TCZ-4R7	C10V47C	CCTO-470	CNO-547	10TCC-V47
C21	4.7		NPO-SI 4.7	TCZ-4R7	C10V47C	CCTO-470	CNO-547	10TCC-V47
C22	.033 200V 10%		V48C2S33-10%		PM4S33	4DP-2-333 *	GEM-4133	4TM-S33
C23	47 N080	#22-2467						
C24	3.3		NPO-SI 3.3	TCZ-3R3	C10V33C	CCTO-3R3	CNO-533	10TCC-V33
C25	50		NPO-SI 50	TCZ-50	C10Q50C	CCTO-51	CNO-450	10TCC-Q50
C26	27		SI 27	D6-270	L10Q27	CCD-270	UC-5427	5GA-Q27
C27	10		SI 10	D6-100	L10Q1	CCD-100	UC-541	5GA-Q10
C28	50		SI 50	D6-500	L10Q5	CCD-500	UC-545	5GA-Q50
C29	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C30	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C31	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C32	1000 1000V 10%		DI-1000	DD-102		CCD-102	GP210	10TS-D10
C33	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C34	4.3 10%		NPO-SI 4.7	TCZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C35A	1000 10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
B	1000 10%		DI-1000	DD-102	PM6D1	CCD-102	GP210	10TS-D10
C36	470 1000V		DI-470	DD-471	BYA10T47 L10V8	CCD-471 *	B-347	5GA-T47 10TS-V75
C37	7.5	#22-2742						
C38	20 N75 10%	#22-3139						
C39	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C40	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-322	5HK-D22
C41	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-322	5HK-D22
C42	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C43	470 1000V		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C44	3300		BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C45	.0068 200V 10%		V84C6D68-10%		PM6D68	6DP-1-682	GEM-16268	6TM-D68
C46	.022 400V 10%		P488N-022		PM4S22	4DP-2-223	GEM-1612	4TM-S22
C47	.1 600V		P688N-1	DF-104	CUB6P1	6DP-4-104	GEM-601	6TM-P1
C48	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C49	1000 1000V 10%		DI-1000	DD-102		CCD-102 16DP4-2-153	GP210	10TS-D10 10TM-S15
C50	.015 1000V 10%	#22-3040						
C51A	51		DI-50	DD-510	L10Q51	CCD-500	GP450	10TS-Q50
B	51		DI-50	DD-150	L10Q51	CCD-500	GP450	10TS-Q50

PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS (cont)

ITEM No.	RATING		REMARKS	REPLACEMENT DATA: AEROVOX Part No.	CENTRALAB Part No.	CORNELL-DUBILIER Part No.	ELMENCO Part No.	MALLORY Part No.	SPRAGUE Part No.
C52A	1000	10%		DI-1000	DD-102	PM5D1	CCD-102	GP10	10TB-D10
B	1000	10%		DI-1000	DD-102	PM5D1	CCD-102	GP10	10TB-D10
C53	047	200V		P388N-047	DD-503	CUB3B47	4DP-3-473	GEM-4147	3TM-S47
C54	470	1000V		BPD-00047	DD-471	BYA10T47	CCD-103	B-347	5GA-747
C55	680	10%		1489-00068	DD-681	1R5T68	CM-20B-681	MCJ349	M5-368
C56	3300	10%		1464-00033		1R5D33	CM-20B-332	MCJ462	M5-333
C57	470	1000V		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-747
C58A	1500			BPD-2X0015	DD5-152	BYC5DD15	CCD-152	B2X215	5X5-1S15
B	1500						CCD-152		
C59	10000			BPD-01	DD-103	BYA10S3	CCD-103	B-110	5X5-1S10
C60	4700	10%		DI-4700		PM8D47	CCD-472	JL-347	10TB-D47
C61	.1	600V		P688N-1	DF-104	CUB4P1	6DP-4-104		6TM-P1
C62	130	4000V N1500 10%	#22-2697				*		
C63	47	3000V N750					*		

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
# Zenith Part Number.

CONTROLS

ITEM No	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: ZENITH Part No.	CENTRALAB Part No.	CLAROSTAT Part No.	IRC Part No.	MALLORY Part No.	INSTALLATION NOTES
R1A	1meg		63-4610				PP16L	Volume
B	Shaft						D8-37	
C	Switch						Not Req.	Push-Pull Off-On
R2	1500Ω	2(WW)	63-4630	WW-152 *	39-1500 *	112-1500 *	FL-1.5K *	Vert. Lin.
	270Ω Stop							
R3	30K		63-4689					Contrast
	10K Tap							
R4A	250K		63-4627	B-51	A47-250K-Z	Q11-130	U44	Brightness
B	Shaft			Not Req.	KB8-3	Not Req.	Not Req.	
R5A	7.5meg		63-4658	AB-90	A47-7.5meg-S	BU1-142	PTA75L	Vert. Size
B	Shaft			AK-1	FKB-1/4	TM-4	Not Req.	
R6A	750K		63-4656	B-86	A47-750K-S	Q11-136	U54	Vert. Hold
B	Shaft			Not Req.	KB8-3	Not Req.	Not Req.	
R7A	1meg		63-4658	B-70	A47-1meg-Z	Q12-157	U53	Tone
B	Shaft			Not Req.	KB8-3	Not Req.	Not Req.	
R8A	3meg		63-4656	AB-84	B47-3meg-S	BU1-140	SU99	Focus
B	Shaft			AK-19	Not Req.	TM-4	Not Req.	
R9A	10K		63-4696	AB-14	A47-10K-S	BU1-118	TA14L	AGC
B	Shaft			AK-1	FKB-1/4	TM-4	Not Req.	
R10	750Ω	2(WW)	63-3294		39-800 †	112-800 †	FL-750	Buzz
	100Ω Stop							
R11A	5meg		63-4619		B47-5meg-Z	BU1-141	PTA56L	Fringe Lock (Sync Stab.)
B	Shaft				Not Req.	TM-4	Not Req.	

* Use 270Ω resistor in series with terminal. † Use 100Ω resistor in series with terminal.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R12	3300Ω 3W	
R13	22K	
R14	1000Ω	
R15	680K	
R16	2.2meg	
R17	22K	
R18	56Ω	
R19	1500Ω	
R20	56K	
R21	56K	
R22	120Ω	
R23	22Ω	
R24	120Ω	
R25	18K	
R26	8200Ω 3W	
R27	120Ω	
R28	2700Ω	
R29	27K	
R30	39K	
R31	47K	
R32	15K	
R33	100K	
R34	15Ω	
R35	7500Ω 4W	
R36	3900Ω	
R37	330K	
R38	120K	

ITEM No.	RATING	REMARKS
R39	150K	
R40	180K	
R41	470K 1W	
R42	6.2meg	
R43	100K	
R44	22K 2W	
R45	3.3meg	
R46	100K	
R47	330K	
R48	680K	
R49	150K	
R50	82K	
R51	33K	
R52	22K	
R53	56K	
R54	100K	
R55	150K	
R56	680Ω	
R57	390K	
R58	27K 2W	
R59	1000Ω 1W	
R60	8500Ω 1W	
R61	330K	
R62	2.2meg	
R63	1000Ω	
R64	2.2meg	
R65	82K	

ITEM No.	RATING	REMARKS
R66	82K	
R67	470Ω	
R68	560Ω	
R69	560Ω	
R70	330K	
R71	330K	
R72	1meg	
R73	120K	
R74	100K	
R75	100K	
R76	6.8meg	
R77	120K 2W	
R78	47K	
R79	15K	
R80	100Ω	
R81	1meg	
R82	100Ω	
R83	10K 3W	
R84	100K	
R85	1000Ω	
R86	6.8Ω	#63-3305
R87	22K 1W	
R88	220K	#63-3607
R89	330Ω	
R90	27K 2W	

Zenith Part Number

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: ZENITH Part No.	Gramer Part No.	Meissner Part No.	Merit Part No.	Miller Part No.	Ram Part No.	NOTES
L1A	39.75MC Trap	S-41833						
B	47.25MC Trap							
L2A	1st Video IF	S-43591						
B	41.25MC Trap							
L3A	2nd Video IF	S-43443						
B	47.25MC Trap							
L4	3rd Video IF	S-46741						
L5	4th Video IF	S-45852 †						
L6	Series Peaking Coil	S-43678 †		19-3098	19-3098	TV-151	6177	VP-3	90uh
L7	Resonant Choke	S-21888							6uh
L8	Shunt Peaking Coil	S-43618		19-3180	19-3180	TV-184	6180	VP-8	171uh
L8A	Sound Take-Off								
B	4.5MC Trap								
L9	Shunt Peaking Coil	S-18011		19-3250	19-3250	TV-186	6181	VP-8	250uh
L11	Series Peaking Coil	S-43618		19-3180 *	19-3180 *	TV-184 *	6180 *	VP-5 *	170uh ①
L12	2nd Sound IF	S-41899		17-1021 ▲	17-1021 ▲	TV-149			
L13	Quadrature Coil	S-45239 †		20-1005 ■	20-1005 ■	TV-121 ■	1480 ■		10.4uh
L14	Resonant Choke	S-32777							

† Part of M5. * Parallel with 5800Ω resistor. ■ Remove C38 (20mmf Cap.).
▲ Enlarge mounting hole. ① Wound on 5800Ω resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: ZENITH Part No.	Halldorson Part No.	Merit Part No.	Miller Part No.	Ram Part No.	Thordarson Part No.	NOTES
L15	94Ω		S-45679	HS-7	TV-165			HS-7	Tapped ② 36Ω

FILTER CHOKE

ITEM No.	RATINGS: CURRENT (Measured)	DC RES.	INDUCTANCE @ CURRENT 1000 "Ω"	REPLACEMENT DATA: ZENITH Part No.	Halldorson Part No.	Merit Part No.	Ram Part No.	Stancor Part No.	Thordarson Part No.	Triad Part No
L16	270A	80Ω	1.3 Hy.	95-1681	28C44	C-1996	F-501	C-3238	28C44	C-28X

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	SEC. 1	SEC. 2	REPLACEMENT DATA: ZENITH Part No.	Halldorson Part No.	Merit Part No.	Ram Part No.	Stancor Part No.	Thordarson Part No.	Triad Part No
T1	UTY ① 1.8A	620VCT ② .280A	5V ③ 4A	95-1680						R-80BC
	SEC. 3	SEC. 4	SEC. 5							
	6.3V ③ 9.1A									

① Use 8 to 1 turns ratio. Connect as autoformer.
② Cut and tape green lead.
③ Connect yoke terminal #2 to terminal #4 of Horizontal Output Transformer, yoke terminal #7 to terminal #2 of Horizontal Output Transformer, connect 1000Ω, ½ watt resistor from yoke terminals #1 and #3 to terminal #3 of Horizontal Output Transformer.
④ Use original rear cover and yoke damping capacitor.
⑤ Connect yoke terminal #3 to terminal #4 of Horizontal Output Transformer, yoke terminal #1 to terminal #2 of Horizontal Output Transformer, connect 1000Ω, ½ watt resistor from yoke terminals #2 and #7 to terminal #3 of Horizontal Output Transformer.
⑥ Cut and form a piece of .010 gauge tin paper inside the yoke itself and support with an acetate cement, to provide an insulation between width sleeve and the yoke proper.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: ZENITH Part No.	Halldorson Part No.	Merit Part No.	Ram Part No.	Rogers Part No.	Stancor Part No.	Thordarson Part No.	Triad Part No
T2	Vert. Output	95-1658	26S75 ①	A-2821	V314	VO35 ②	A-8149	26S75 ①	A-13LX
T3	Yoke-Horiz. (23.8MC) (90°)—Vert. (44MH) Rear Cover & Centering Device Horiz. Output	95-1654	Y-39 ①	MD7-81 ④⑤⑥	Y90F12/47 ④⑤⑥	PCM1045 ③	DY-12A ④ ⑤	Y-39 ④	Y-49 & NW-3 ① YC-1
		S-23237							
T4	Horiz. Output	S-45701							

① Use 8 to 1 turns ratio. Connect as autoformer.
② Cut and tape green lead.
③ Connect yoke terminal #2 to terminal #4 of Horizontal Output Transformer, yoke terminal #7 to terminal #2 of Horizontal Output Transformer, connect 1000Ω, ½ watt resistor from yoke terminals #1 and #3 to terminal #3 of Horizontal Output Transformer.
④ Use original rear cover and yoke damping capacitor.
⑤ Connect yoke terminal #3 to terminal #4 of Horizontal Output Transformer, yoke terminal #1 to terminal #2 of Horizontal Output Transformer, connect 1000Ω, ½ watt resistor from yoke terminals #2 and #7 to terminal #3 of Horizontal Output Transformer.
⑥ Cut and form a piece of .010 gauge tin paper inside the yoke itself and support with an acetate cement, to provide an insulation between width sleeve and the yoke proper.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: ZENITH Part No.	Halldorson Part No.	Merit Part No.	Ram Part No.	Stancor Part No.	Thordarson Part No.	Triad Part No.	NOTES
T5	10.5K	3-4Ω	95-1589	34S52	A-2932	AU-608	A-3879	34S52	S-17X	

SPEAKER

ITEM No.	TYPE: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: ZENITH Part No.	QUAM Part No.	NOTES
SP1	6" x 9"	PM	8-8Ω	49-831 ① ②	69AI26.8	① Models D3248E, R, W
SP2	6" x 7"	PM	8-8Ω	49-830 ③ ④	57AI26.5	② Models D3248E, R, W, D3284H, R
	5"	PM	3-4Ω	49-761 ④	52AI	③ Models D3247E, L, M, R, W, D3007E, M, R, W, Y
	8"	PM	3-4Ω	49-780 ⑤	6AI	④ Models D3208R, Y, D3202R, D3215L, R, Y
				49-889 ⑥		⑤ Models D3245E, R, ※, D3004E, R, W, D3008R
				49-818 ⑦		⑥ Models D3217E, R, W, D3002E, R, W
				49-851 ⑧ ⑨		⑦ Models D3250H, M, R, W, D3255E, L, R, W, D3008R
				49-907 ⑩		⑧ Models D2873E, R, W
				49-842 10		⑨ Models D3005E, L, M, R, W
				49-846 11		10 Models D3008E, L, R, W, D8009E, W, Y
						11 Models D3284H, R

RECTIFIERS

ITEM No.	RATING: CURRENT (Measured)	REPLACEMENT DATA: ZENITH Part No.	INTERNATIONAL Part No.	ITT Part No.	SARKES TARZIAN Part No.	SYLVANIA Part No.	NOTES
M1		103-20①	SD-91 ③	H3615 ①			① Dual Sel. Diode ② Silicon, 2 required.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	ZENITH Part No.	REPLACEMENT DATA	
K1	Vert. Integrator		87-5	Sprague	V-16
K2	Vert. Feedback		87-4	Sprague	V-14

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA: ZENITH Part No. FUSE	ZENITH Part No. HOLDER	LITTELFUSE Part No FUSE	LITTELFUSE Part No HOLDER	BUSS Part No FUSE	BUSS Part No HOLDER
M2	N	7/10A 250V 8/B	136-38	68-21	332.750 (N 7/10 250V 8/B)	346010	N 7/10	HN 1/2 to 3/4
M3	1" Length of #24 Wire							

CRYSTAL DIODES

ITEM No.	CRYSTAL TYPE	REPLACEMENT DATA: ZENITH Part No.	CBS Part No.	RAYTHEON Part No.	SYLVANIA Part No.	NOTES
M4		103-33	1N86	1N295	1N295	Video Det. (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH Part No.	NOTES
M5	Tuner	175-134	VHF, All Models in the D200 Series, except D230R, Y, D280R, D281Y
	Tuner	175-132	VHF, Models D230R, Y, D230ZR, D231SY
	Tuner	175-136	VHF, All Models in the D3000 Series
	Tuner	175-133	VHF with UHF provisions, All "U" Models in the D2000 Series, except D230RU, YU, D230ZRU, D231SYU
	Tuner	175-131	VHF with UHF provisions, Models D230IRU, YU, D230ZRU, D231SYU
	Tuner	175-8	UHF
M6	4th IF Transformer	S-46869	Includes M4, L6, L6, C19, C30, C31
M7	Magnet	S-46005	Correction (2 used)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	192-265	Models D230R, W, D230ZR, D234SE, R, ※, D238E, R, W, D238H, R
Safety Glass	192-262	Models D2350W, R, M, R, D2355W, R, L, E
Safety Glass	192-279	Models D2345W, R, E, D2347E, L, M, R, D2317W, R, E, D2315Y, R, L, D234SE, R, D3002E, R, W, D3008E, L, M, R, W
Safety Glass	192-264	Model D2301Y
Safety Glass	192-263	Models D2873E, R, W
Safety Glass	192-263	Models D8004E, R, W, D3008E, L, R, W, D8007E, M, R, W, Y, D8008R, D3009E, W, Y
Knob	46-2171	Channel Selector, Models D238E, R, W, D2384E, R, D2873E, R, W, D2317E, R, W, D2345E, R, ※, D2347E, L, M, R, W, D2348E, R, W, D2350H, M, R, W, D2355E, L, R, W
Knob	8-47420	Channel Selector, Models D3002E, R, W, D3004E, R, W, D3008E, L, M, R, W, D3006E, L, R, W, D3007E, M, R, ※, Y, D3008R, D3009E, W, Y
Knob	8-46280	Fine Tuning, All D2000 Series except "U" Models
Knob	46-2035	Fine Tuning, All D3000 Series Models
Knob	8-45733	UHF Dial Knob, All "U" Models
Knob	8-45715	Volume, Models D230R, Y, D230ZR, D231SLU, RU, YU, D231YU, RU, WU, D2345E, R, W, D2347EU, LU, MU, RU, WU, D2348EU, RU, WU, D2350H, M, R, W, D2355E, L, R, W, D238E, R, W, D2384H, R, D2873E, R, W, D3004E, R, W, D3008E, L, R, W, D3009E, W, Y
Knob	8-46726	Volume, Models D231SL, R, Y, D231YE, R, W, D2347E, L, M, R, W, D2348E, R, W, D3002E, R, W, D3008E, L, M, R, W, D3007E, M, R, Y
Knob	8-45872	Brightness, Tone, Vert. Hold, Models D230R, Y, D230ZR, D234SE, R, W, D2350H, M, R, W, D2355E, R, ※, D238E, R, W, D2384H, R, D2873E, R, W, D3004E, R, ※, D3006E, L, R, W, D3008R, D3009E, W, Y
Knob	8-46725	Brightness, Tone, Vert. Hold, Models D2315L, R, Y, D231YE, R, W, D2347E, L, M, R, W, D2348E, R, W, D3002E, R, W, D3008E, L, M, R, W, D3007E, M, R, W, Y
Knob	8-41682	Contrast, Models D230R, Y, D230ZR, D234SE, R, W, D2350H, M, R, W, D2355E, L, R, ※, D238IE, R, W, D2384H, R, D2873E, R, W, D3004E, R, W, D3006E, L, R, W, D3008R, D3009E, W, Y
Knob	8-46724	Contrast, Models D2315L, R, Y, D231YE, R, W, D2347E, L, M, R, W, D2348E, R, W, D3002E, R, W, D3006E, L, M, R, W, D3007E, M, R, W, Y
Knob	78-1028	Horiz. Hold, Models D230R, Y, D230ZR, D234SE, R, W, D2350H, M, R, W, D2355E, L, R, W, D238IE, R, W, D2384H, R, D2873E, R, W, D3004E, R, W, D3006E, L, R, W, D3008R, D3009E, W, Y
Cabinet	14-2792E	Model D2872E
Cabinet	14-2792R	Model D2872R
Cabinet	14-2792W	Model D2872W
Cabinet	14-2694	Model D3002E
Cabinet	14-2693	Model D3002R
Cabinet	14-2695	Model D3002W
Cabinet	14-2797E	Model D3004E
Cabinet	14-2797R	Model D3004R
Cabinet	14-2797W	Model D3004W
Cabinet	14-2757E	Model D3005E
Cabinet	14-2757L	Model D3005L
Cabinet	14-2757M	Model D3005M
Cabinet	14-2757R	Model D3005R
Cabinet	14-2757W	Model D3005W
Cabinet	14-2769E	Model D3006E
Cabinet	14-2769L	Model D3006L
Cabinet	14-2769R	Model D3006R
Cabinet	14-2769W	Model D3006W
Cabinet	14-2801E	Model D3007E
Cabinet	14-2801M	Model D3007M
Cabinet	14-2801R	Model D3007R
Cabinet	14-2801W	Model D3007W
Cabinet	14-2801Y	Model D3007Y
Cabinet	14-2756R	Model D3008R
Cabinet	14-2752E	Model D3009E
Cabinet	14-2752W	Model D3009W
Cabinet	14-2783Y	Model D3009Y

ZENITH CHASSIS 16D21, Q, U

FOLDER 2

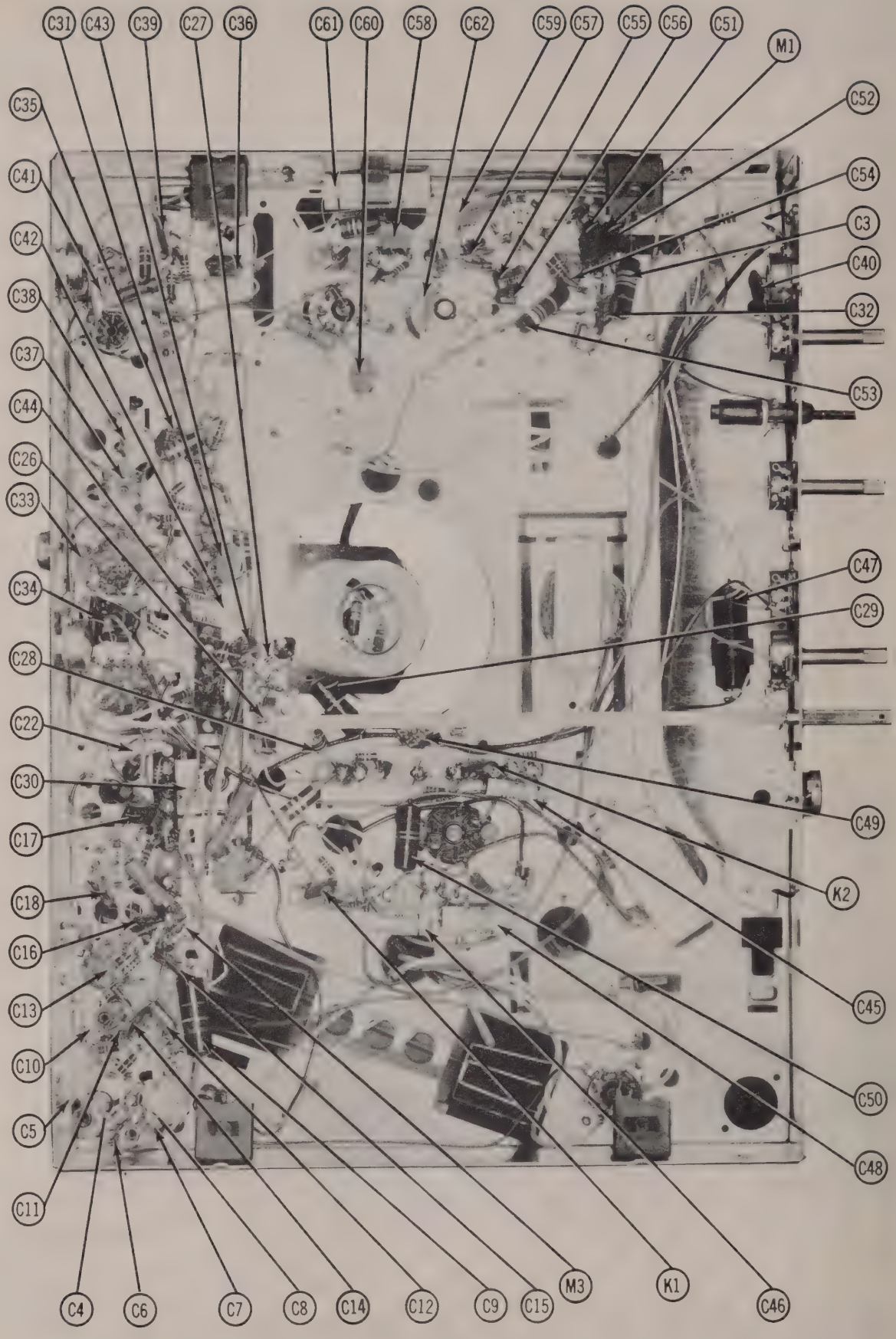
PARTS LIST AND DESCRIPTIONS (Continued)

CABINETS & CABINET PARTS (cont)

NAME	PART NO.	DESCRIPTION
Knob	46-1118	Horiz. Hold, Models D2315L, R, Y, D2317E, R, W, D2347E, L, M, R, W, D2348E, R, W, D3002E, R, D3005E, L, M, R, W, D3007E, M, R, W, Y
Cabinet	14-2721	Model D2301R
Cabinet	14-2722	Model D2301Y
Cabinet	14-2726	Model D2302R
Cabinet	14-2696	Model D2315L
Cabinet	14-2692	Model D2315R
Cabinet	14-2691	Model D2315Y
Cabinet	14-2694	Model D2317E
Cabinet	14-2693	Model D2317R
Cabinet	14-2695	Model D2317W
Cabinet	14-2761E	Model D2345E
Cabinet	14-2761R	Model D2345R
Cabinet	14-2761W	Model D2345W
Cabinet	14-2802E	Model D2347E
Cabinet	14-2802L	Model D2347L
Cabinet	14-2802M	Model D2347M
Cabinet	14-2802R	Model D2347R
Cabinet	14-2802W	Model D2347W
Cabinet	14-2810E	Model D2348E
Cabinet	14-2810R	Model D2348R
Cabinet	14-2810W	Model D2348W
Cabinet	14-2770H	Model D2350H
Cabinet	14-2770M	Model D2350M
Cabinet	14-2770R	Model D2350R
Cabinet	14-2770W	Model D2350W
Cabinet	14-2790E	Model D2355E
Cabinet	14-2790L	Model D2355 L
Cabinet	14-2790R	Model D2355R
Cabinet	14-2790W	Model D2355W
Cabinet	14-2842E	Model D2381E
Cabinet	14-2842R	Model D2381R
Cabinet	14-2842W	Model D2381W
Cabinet	14-2789H	Model D2384H
Cabinet	14-2789R	Model D2384R

WIRING DATA

High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-in	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor



CHASSIS BOTTOM VIEW – CAPACITOR & MISC. IDENT.

REMOTE CONTROL
PARTS LIST AND DESCRIPTIONS (Continued)

RECTIFIERS

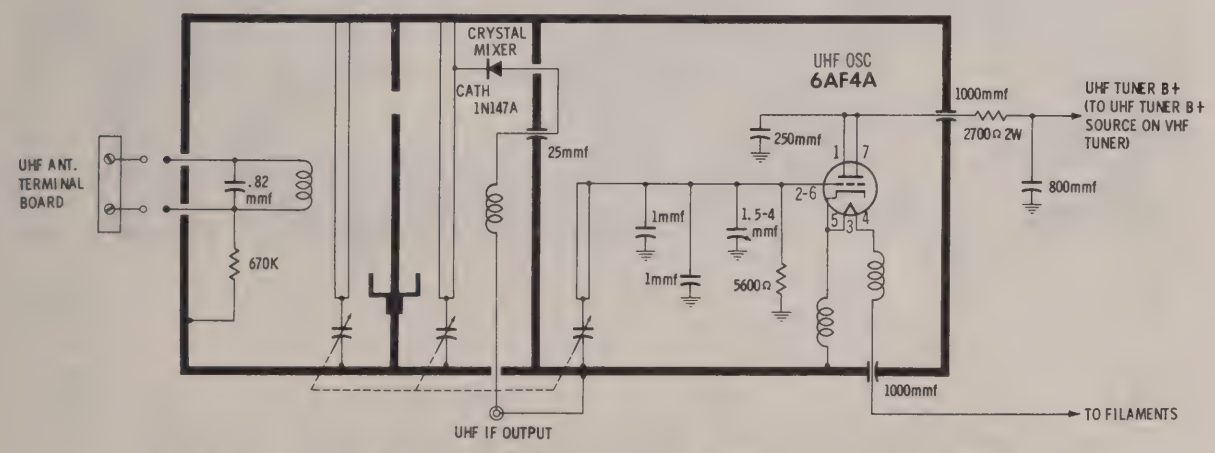
ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	ZENITH PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.0015	212-21 ①			12		① Selenium type.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			ZENITH PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	3AG	3/4A 250V S/B	136-41	83-3027	312.750 (3AG 3/4A 250V S/B)	356001	MDL 3/4	4406

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M3	Switch	85-580	Auto-Manual (DPDT Slide Type)
M4	Relay	195-5	Clockwise
M5	Relay	S-47379	Step Assy. Includes Step switch (Part #S-43848)
	Microphone	S-46826	Assembly, Ch. S-47113
	Microphone	S-46824	Assembly, Ch. S-47053
	Microphone	S-47486	Assembly, Ch. S-47043



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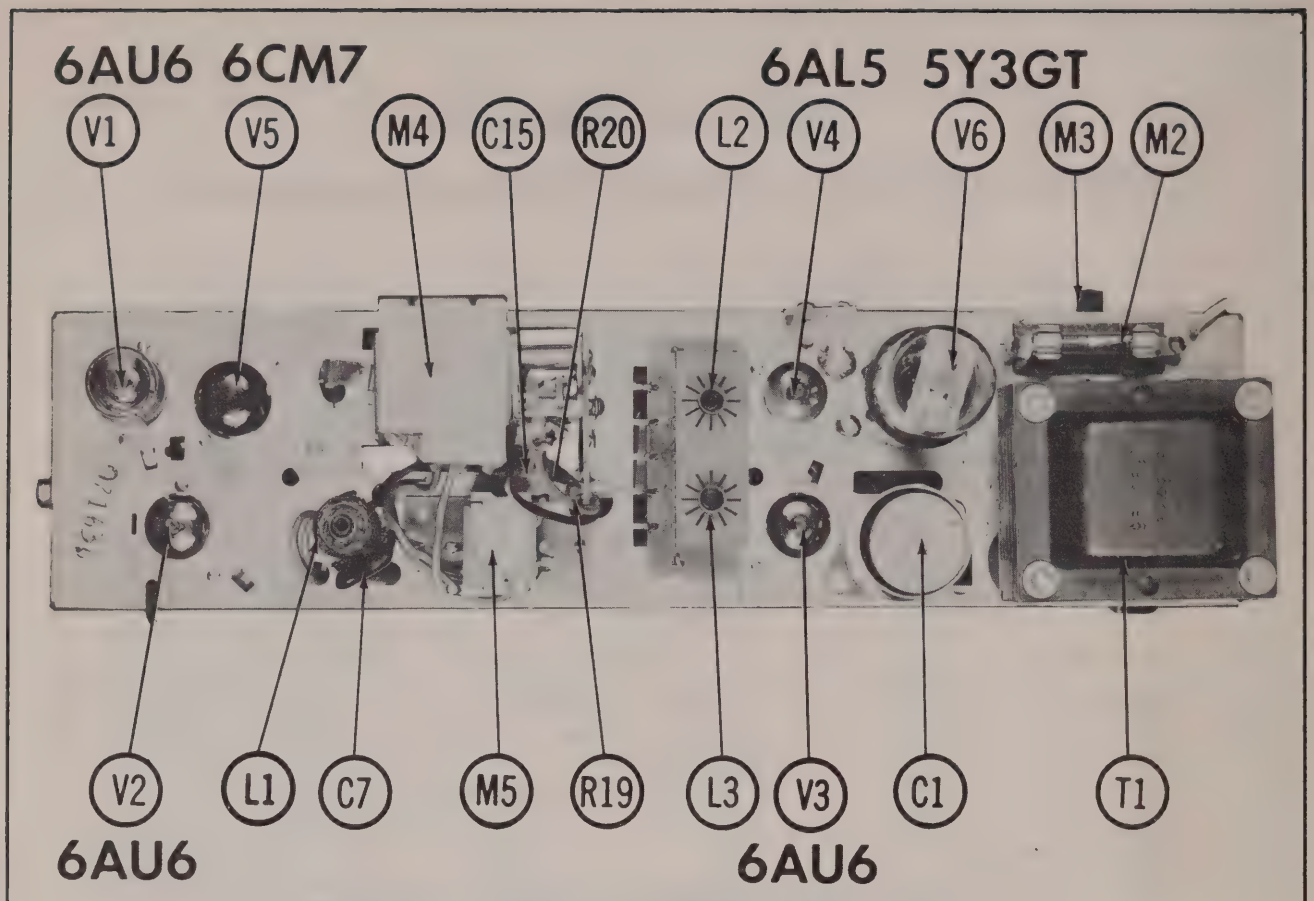
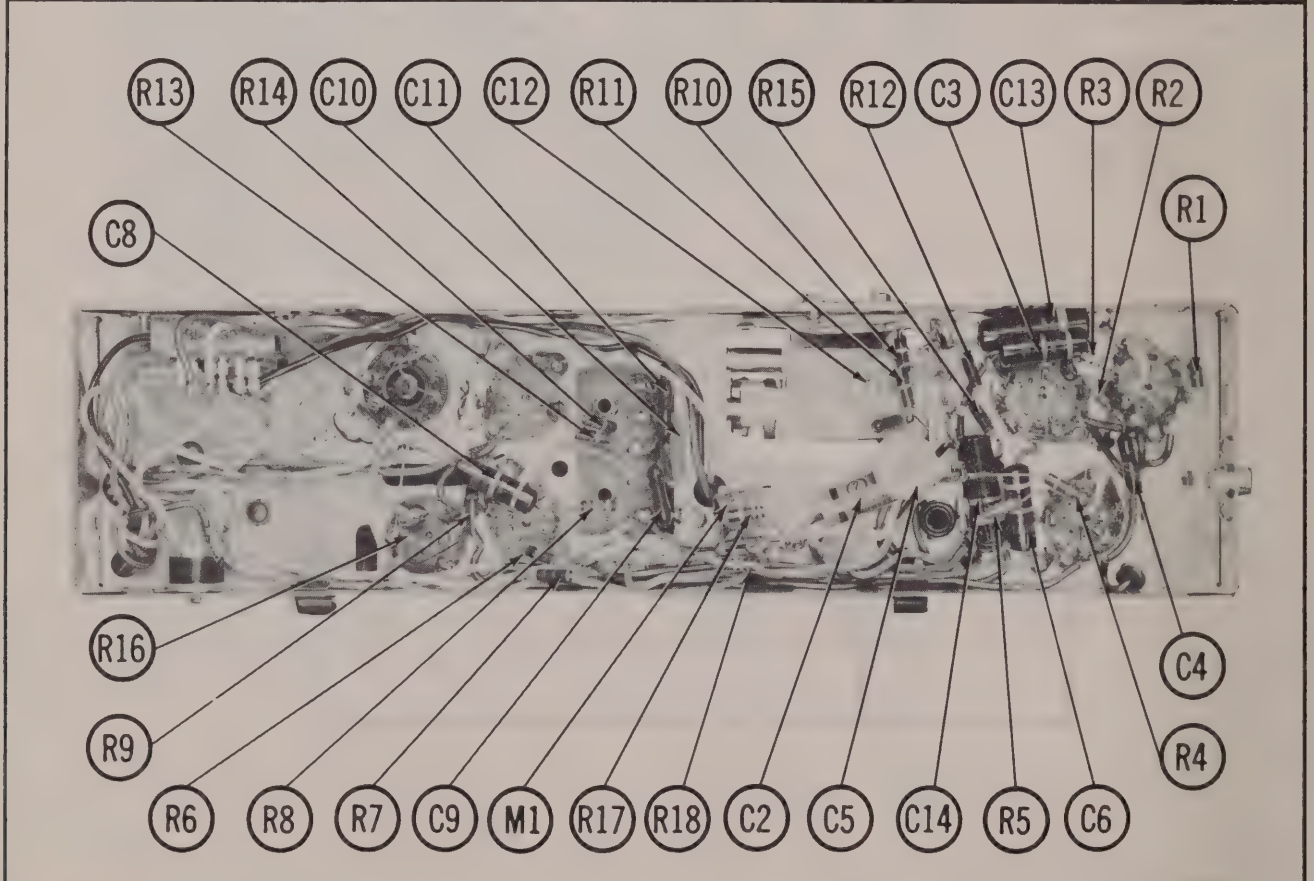
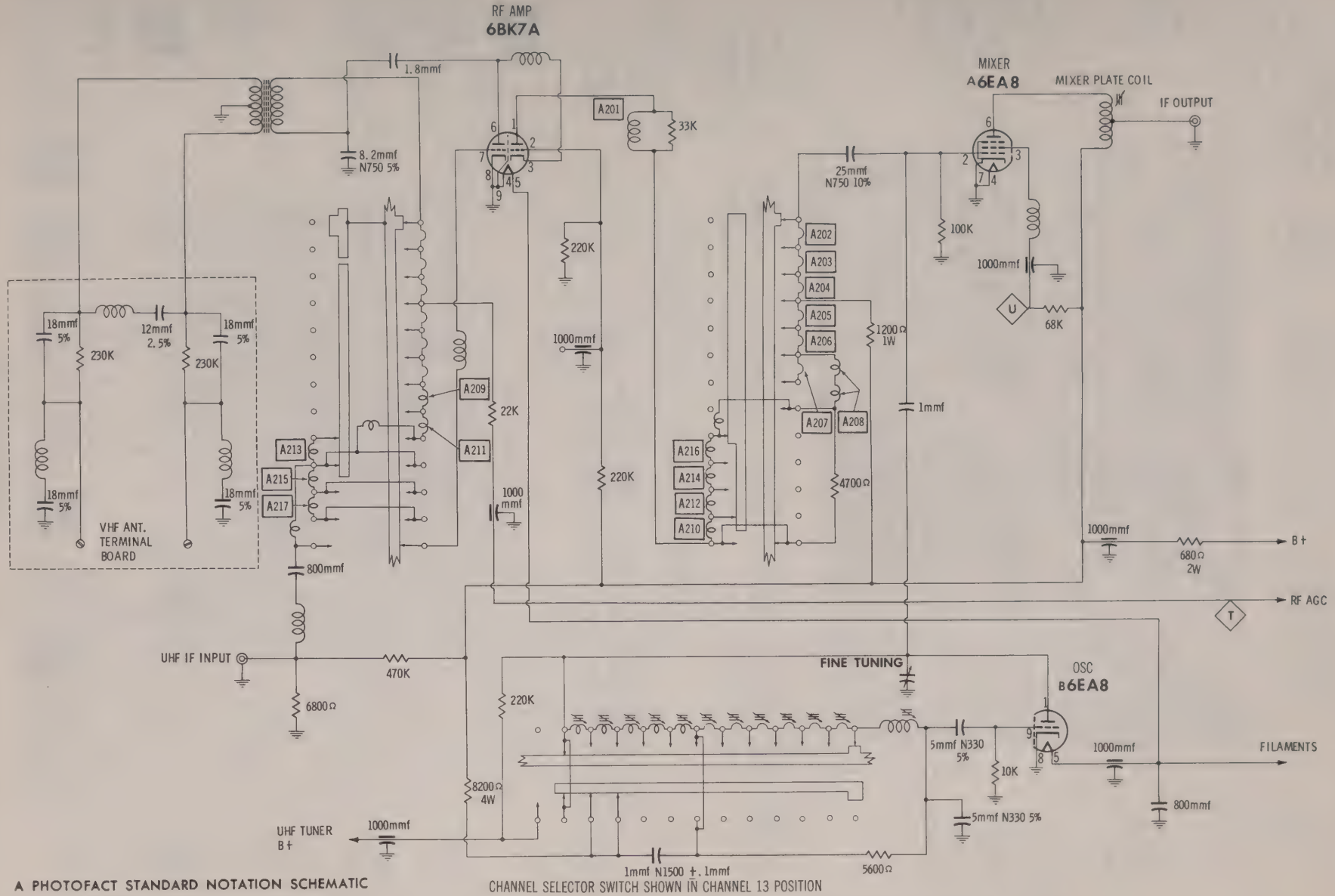
UHF TUNER 175-8



REMOTE CONTROL S-47043 - TOP VIEW



REMOTE CONTROL S-47043 - BOTTOM VIEW



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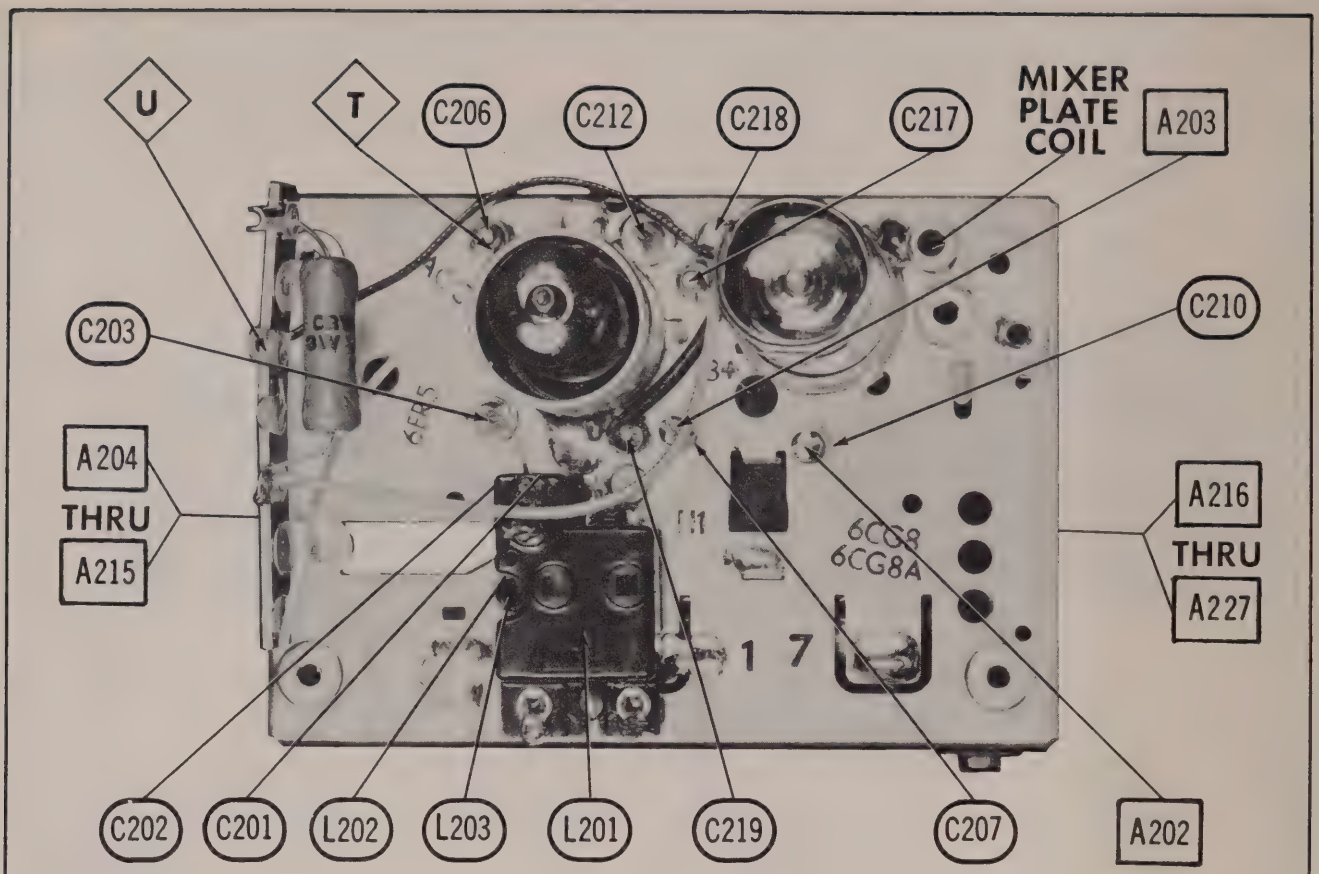
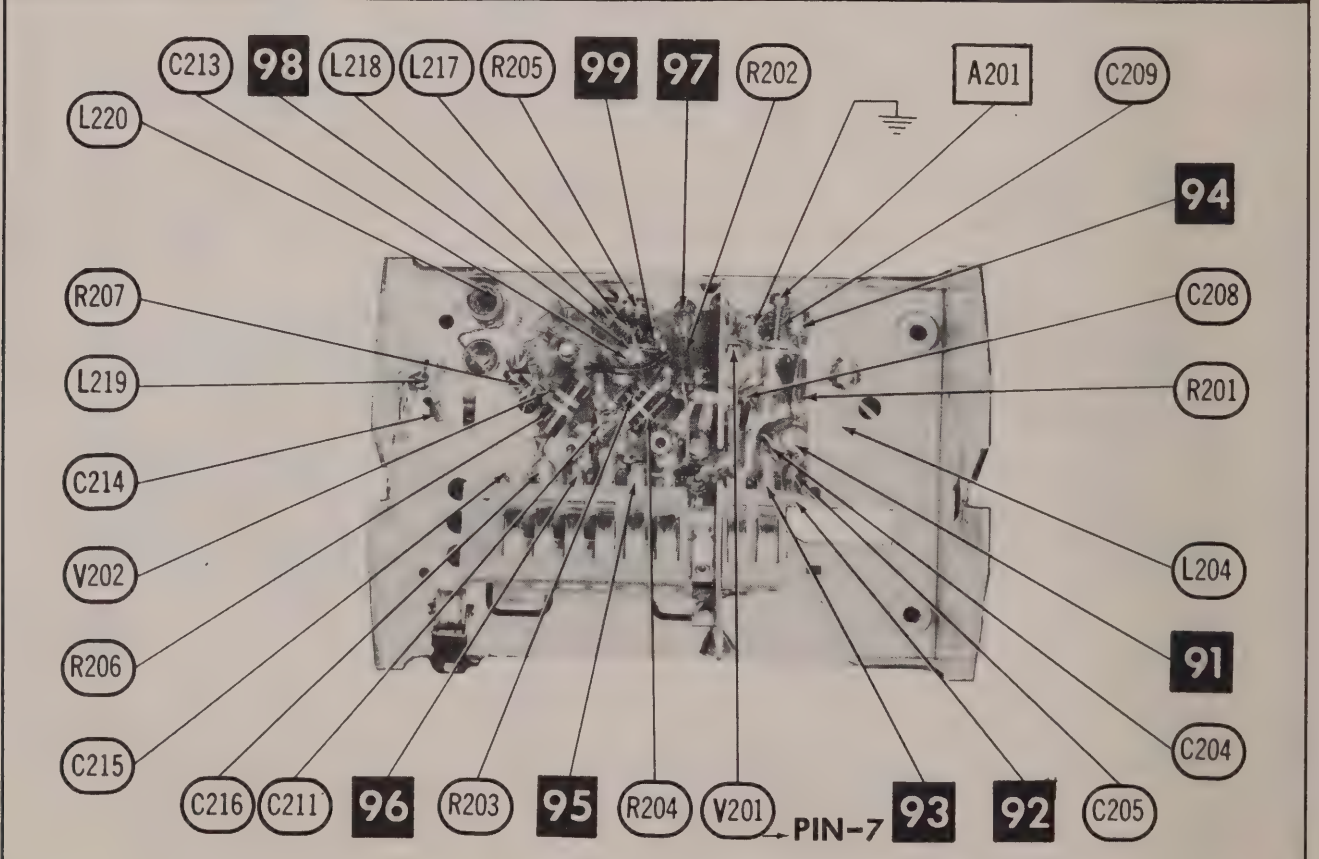
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION

VHF TUNER WITH UHF PROVISIONS 175-121, -131



TUNER 175-130 - TOP VIEW



TUNER 175-130
BOTTOM VIEW

A Howard W. Sams CIRCUITRACE* Photo

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

TUNER ALIGNMENT INSTRUCTIONS

175-121, -122, -131, -132

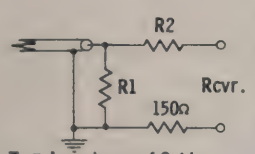
PRE-ALIGNMENT INSTRUCTIONS

The high voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: A201 thru A203 ... GENERAL CEMENT #5000, 5003, 8276, 8290
WALSCO #2512, 2525
A216 thru A227 ... GENERAL CEMENT #8607, 9291
WALSCO #2520, 2522, 2523, 2524, 2537

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 2.5 volt bias supply to point (T). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Fig. 201	Across antenna terminals thru matching transformer (Fig. 201).	195MC	193.25MC 197.75MC	10	Vert. Amp. thru 10K to point (U). Low side to chassis.	A201, A202, A203	Adjust A201 and A202 for maximum amplitude and symmetry with markers as shown in Fig. 202. Increase bias for MINIMUM amplitude of response curve. Without changing the bias adjust A203 to obtain MINIMUM response on the scope.
2.	"	"	213MC	211.25MC 215.75MC	13	"	A204	Adjust for maximum amplitude of response similar to Fig. 202. Adjust by expanding or compressing coil turns.
			207MC	205.25MC 209.75MC	12		A205	
			201MC	199.25MC 203.75MC	11		A206	
			195MC	193.25MC 197.75MC	10		A207	
			189MC	187.25MC 191.75MC	9		A208	
			183MC	181.25MC 185.75MC	8		A209	
			177MC	175.25MC 179.75MC	7		A210	
			85MC	83.25MC 87.75MC	6		A211	
			79MC	77.25MC 81.75MC	5		A212	
			69MC	67.25MC 71.75MC	4		A213	
			63MC	61.25MC 65.75MC	3		A214	
			57MC	55.25MC 59.75MC	2		A215	



Zo	R1	R2
50Ω	56Ω	120Ω
75Ω	82Ω	110Ω

FIG. 201

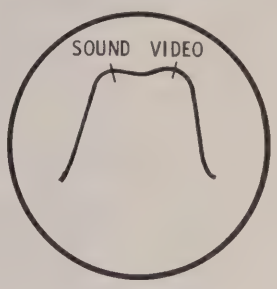


FIG. 202

VHF OSCILLATOR ALIGNMENT

Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
3.	Fig. 201	Across antenna terminals thru matching transformer (Fig. 201).	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K across Video Detector load.	A216	Adjust to place sound marker in trap notch as in Fig. 203. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A217	
			201MC	199.25MC 203.75MC	11		A218	
			195MC	193.25MC 197.75MC	10		A219	
			189MC	187.25MC 191.75MC	9		A220	
			183MC	181.25MC 185.75MC	8		A221	
			177MC	175.25MC 179.75MC	7		A222	
			85MC	83.25MC 87.75MC	6		A223	
			79MC	77.25MC 81.75MC	5		A224	
			69MC	67.25MC 71.75MC	4		A225	
			63MC	61.25MC 65.75MC	3		A226	
			57MC	55.25MC 59.75MC	2		A227	

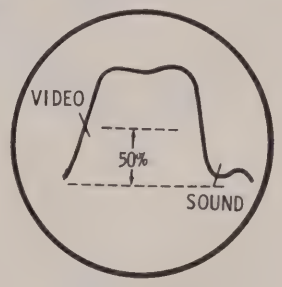
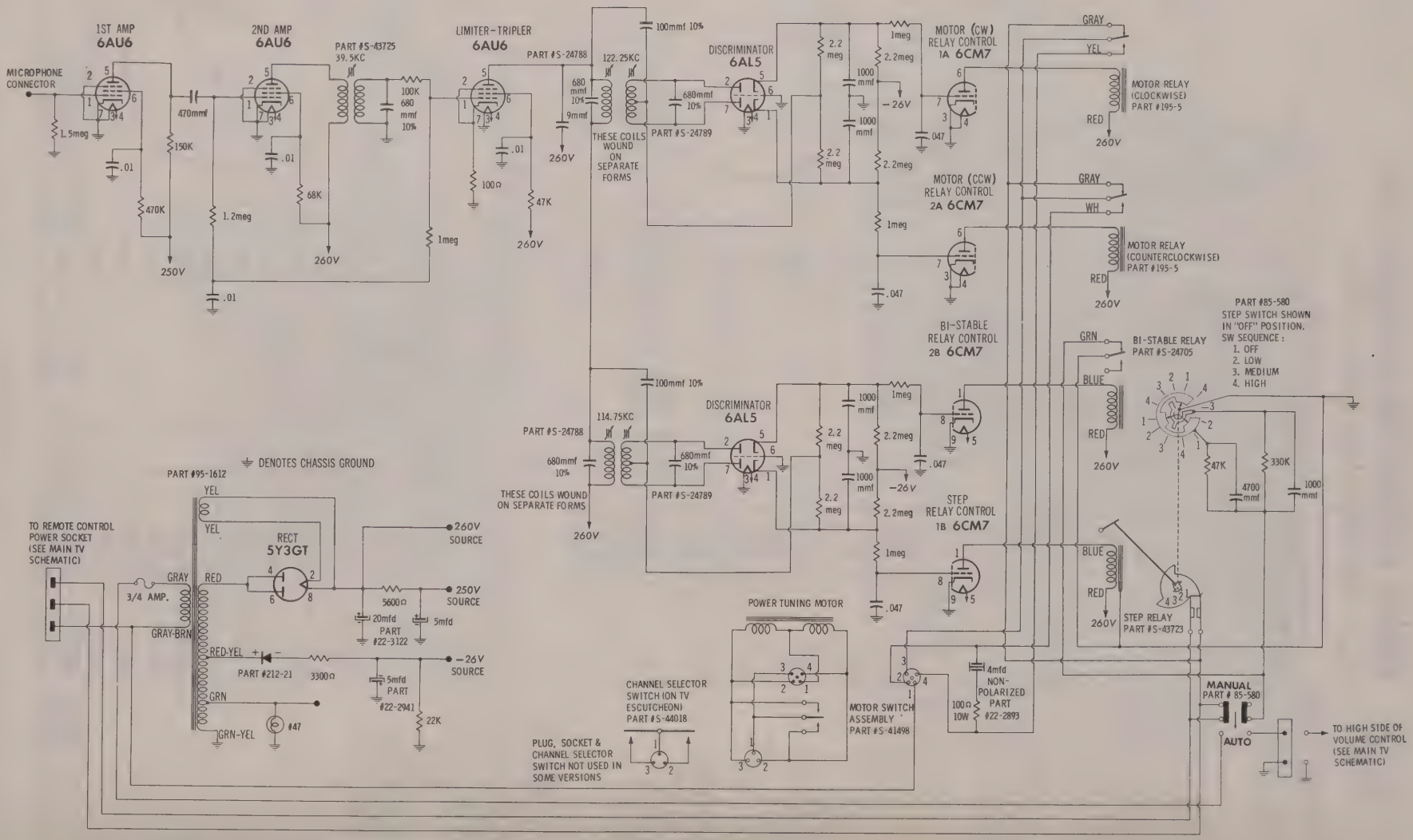


FIG. 203



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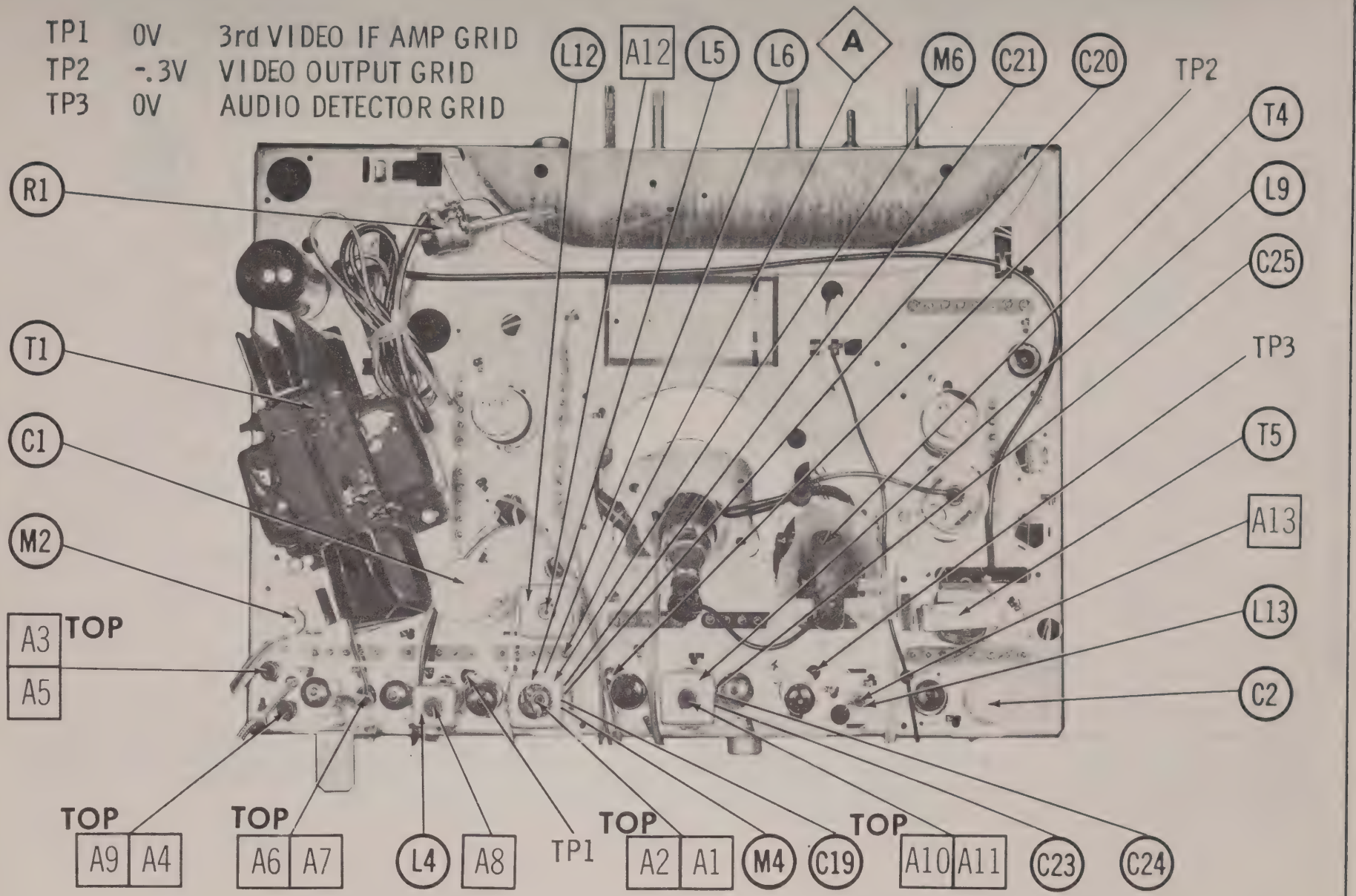
REMOTE CONTROL S-46834, S-46844



CHASSIS - TOP VIEW

16D21, Q, U

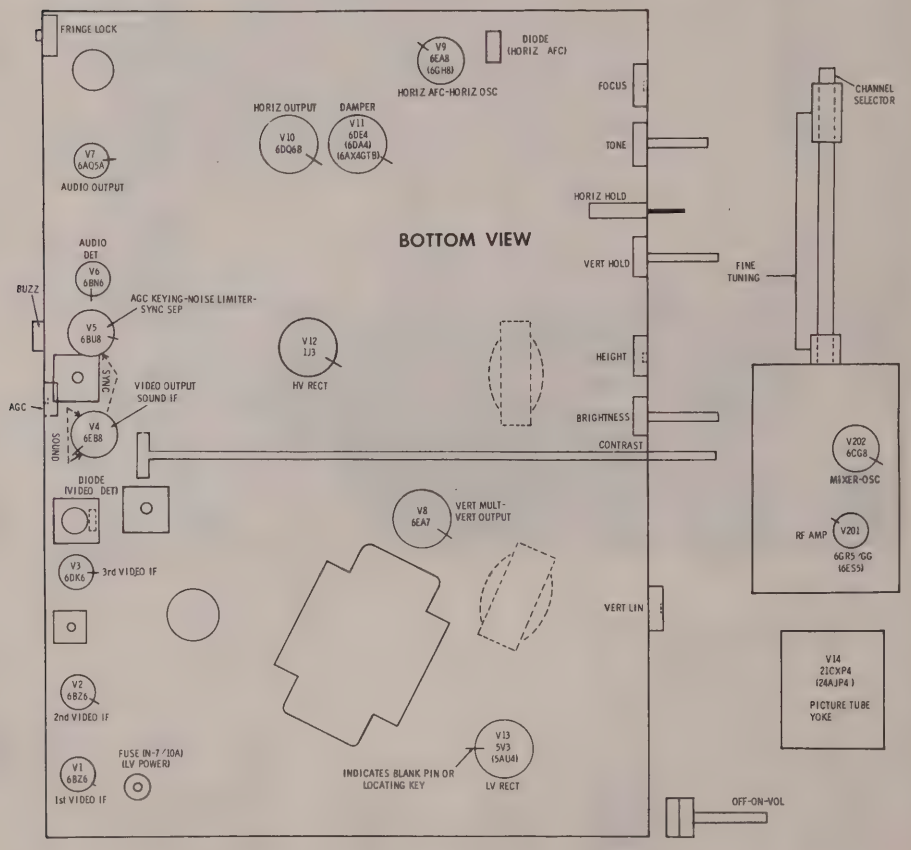
ZENITH CHASSIS

RESISTANCE MEASUREMENTS

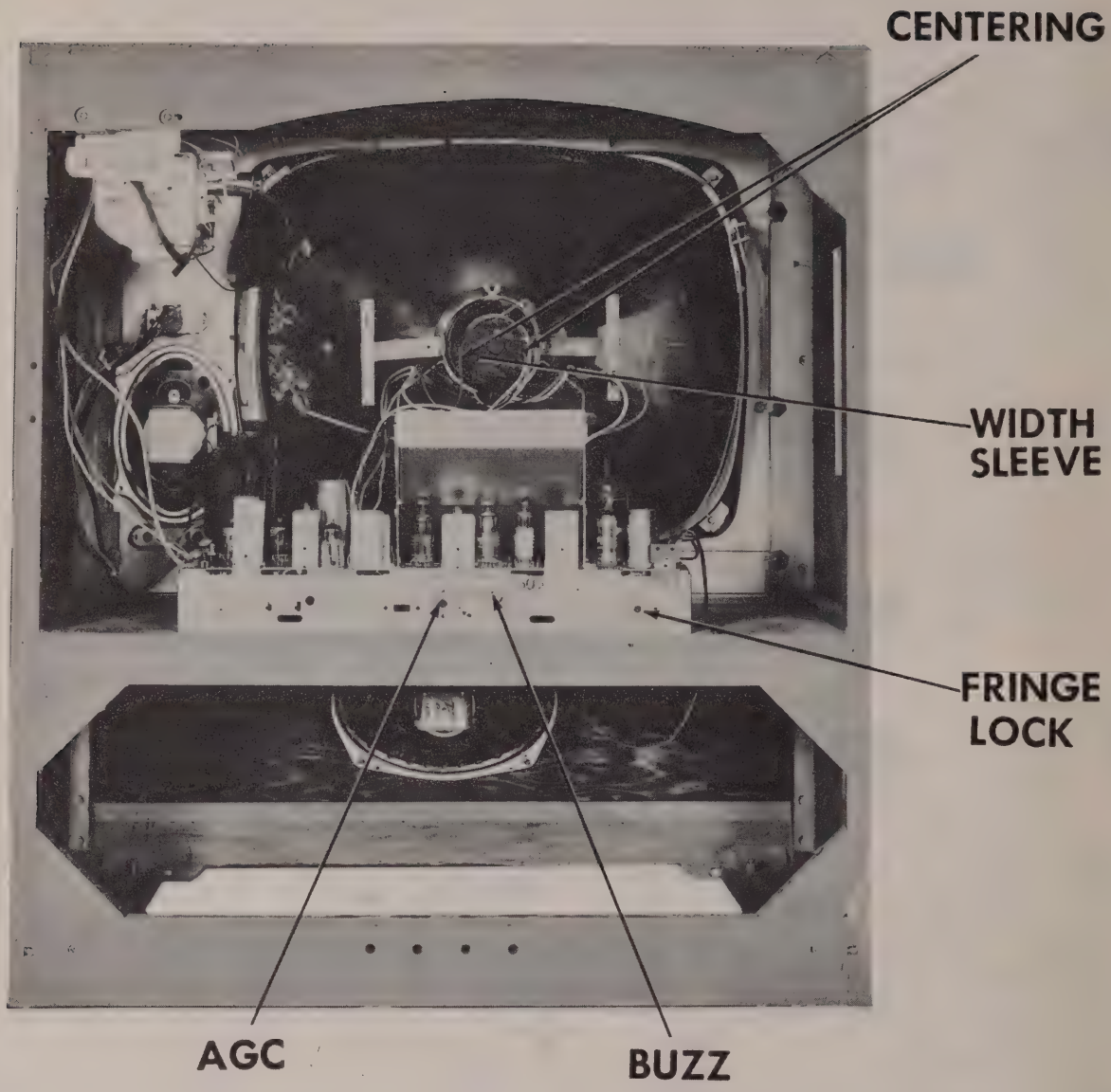
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BZ6	1.5meg	1550Ω	.1Ω	0Ω	△ 240Ω	△ 240Ω	1500Ω		
V2	6BZ6	35K	△22Ω	.1Ω	0Ω	†220Ω	†220Ω	INF		
V3	6DK6	.1Ω	120Ω	.1Ω	0Ω	†8200Ω	†8200Ω	0Ω		
V4	6EB8	0Ω	100K	†150K	.1Ω	0Ω	15Ω	2700Ω	†27K	†6500Ω
V5	6BU8	● 3500Ω	†22K	680K	.1Ω	0Ω	†150K	●†750K	†80K	†8.2meg
V6	6BN6	● 400Ω	.5Ω	.1Ω	0Ω	†27K	3.7Ω	†390K		
V7	6AQ5A	0Ω	680Ω	.1Ω	0Ω	†1800Ω	†1000Ω	0Ω		
V8	6EA7	2.2meg	†345Ω	● 1400Ω	● 700K	● †4.5meg	0Ω	0Ω	.1Ω	
V9	6EA8	†100K	100K	†47K	0Ω	.1Ω	†120K	26Ω	0Ω	1.5meg
V10	6DQ6B	TP	.1Ω	TP	†10K	1meg	NC	0Ω	0Ω	TOP CAP †9Ω
V11	6DE4	NC	NC	¶2.5meg	NC	†0Ω	NC	0Ω	.1Ω	
V12	1J3	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP †285Ω
V13	5V3	NC	¶	TP	29Ω	NC	27 Ω	TP	¶	
V14	21CXP4	.1Ω	0Ω	Pin 6 ● †2meg	Pin 10 †330K	Pin 11 ● 140K	Pin 12 0Ω			
V201	6ER5/GG	0Ω	3meg	0Ω	.1Ω	†4300Ω	0Ω	0Ω		
V202	6CG8A	3900Ω	†18K	0Ω	0Ω	.1Ω	†3300Ω	†36K	0Ω	220K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
● THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM 270V SOURCE.
‡ MEASURED FROM PIN 3 OF V11.
△ MEASURED FROM PIN 7 OF V2.

NC NO CONNECTION.
TP TIE POINT.



TUBE PLACEMENT CHART



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Set the Brightness and Contrast controls for a normal picture.

Turn the Horizontal Hold clockwise until the picture loses sync. It may be necessary to switch off channel and back again for picture to lose sync.

Turn the Horizontal Hold slowly counterclockwise until the picture just falls into sync.

PHOTOFACT* Folder with CIRCUITRACE*

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

AIRLINE MODEL GTM-1666A

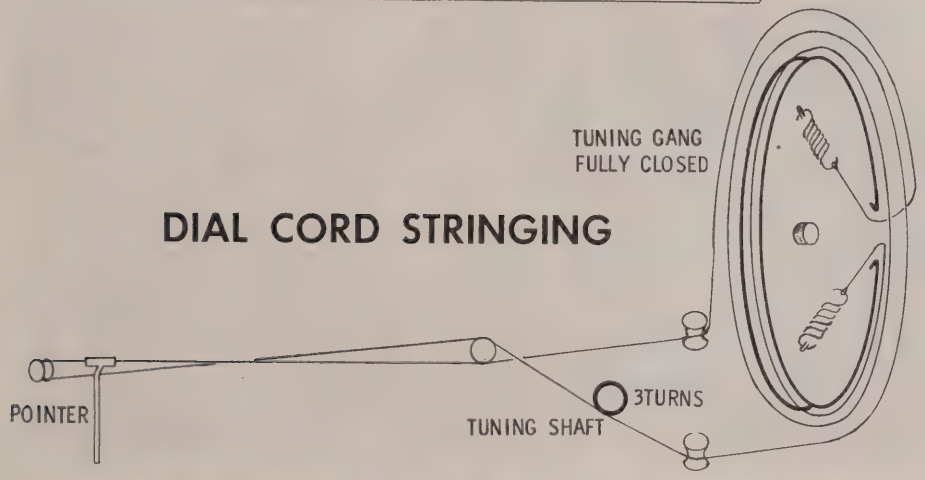
AIRLINE MODEL GTM-1666A

TRADE NAME	Airline Model GTM1666A		
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Illinois		
TYPE SET	AC Operated 7 Tube FM-AM Receiver		
POWER SUPPLY	105-125 Volts AC, 60 Cycles	RATING	29 Watts, .32 Amp. @ 117 Volts AC
TUNING RANGE	BROADCAST 540 - 1625KC	FREQ. MOD.	88 - 108MC

DISASSEMBLY INSTRUCTIONS

1. Remove screw from each side of cabinet rear.
2. Remove screw from center of cabinet rear.
3. Remove screw from bottom of cabinet.
4. Separate cabinet front from cabinet back.

DIAL CORD STRINGING



AIRLINE MODEL GTM-1666A

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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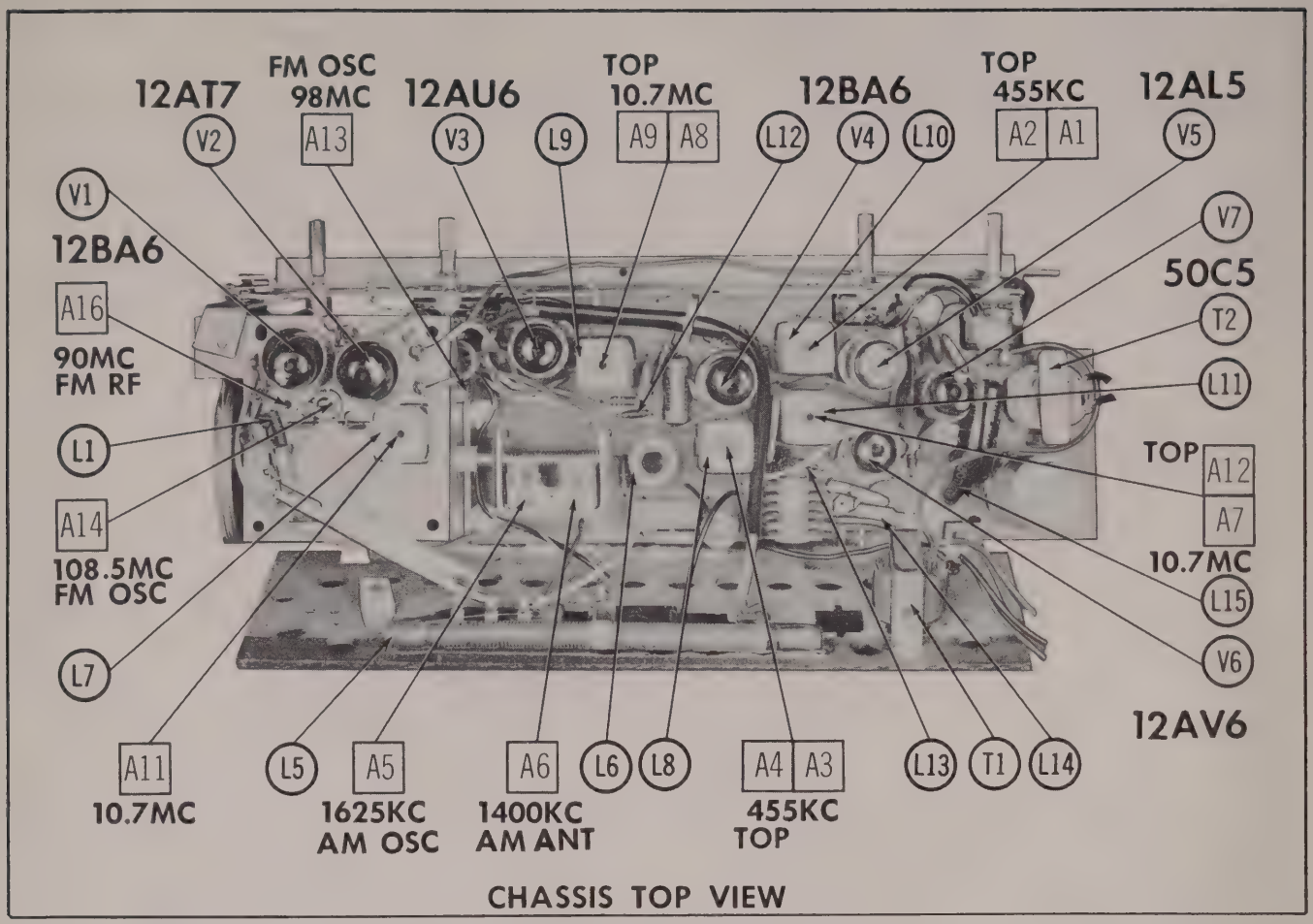
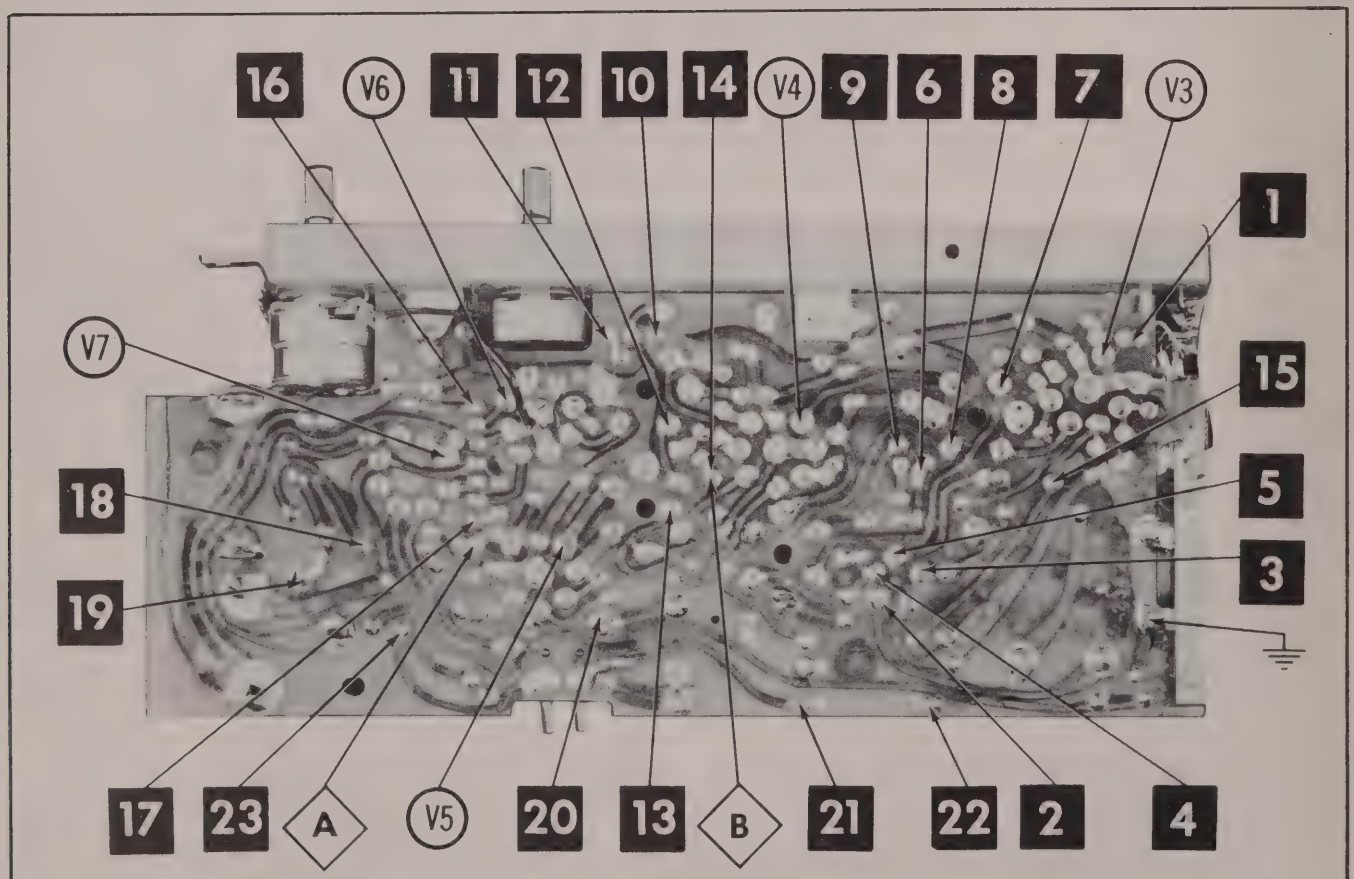


CHASSIS TOP VIEW



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PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use isolation transformer, if available. If not, connect a .1mfd capacitor in series with low side of signal generator.
Suggested Alignment Tools: A1 thru A4 ..... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8987
WALSCO #2531
A5, A6, A14, A15 ..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A7 thru A12, A13, A16 ... GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to RF stator lug of tuning gang. Low side to chassis.	455KC (400∿ Mod.)	AM	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	"	1625KC	"	"	"	A5	"
3.		Loop	1400KC	"	Tune to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output while rocking tuning gang.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100K (±1%) resistors in series from point (A) to chassis. The junction of these two resistors is alignment point (C) as shown on the schematic. Set Volume Control fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.01mfd	High side to pin 2 (grid) of FM Mixer. Low side to chassis.	10.7MC (Unmod.)	FM	Point of non-interference	DC probe thru 100K to point (A). Common to chassis.	A7, A8, A9, A10, A11	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe to point (B). Common to point (C).	A12	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.01mfd	High side to pin 2 (grid) of FM Mixer. Low side to chassis.	10.7MC (450KC Swp.)	FM	Point of non-interference	Vert. Amp. thru 100K to point (A). Low side to chassis.	A7, A8, A9, A10, A11	Disconnect Stabilizing Capacitor C2. Adjust for maximum gain and symmetry similar to Fig. 1.
5.	"	"	"	"	"	Vert. Amp. thru 100K to point (B). Low side to chassis.	A12	Reconnect C2. Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	Fig. 3	Across FM antenna terminals thru matching network (Fig. 3).	98MC (Unmod.)	FM	98MC	DC probe thru 100K to point (A). Common to chassis.	A13	Adjust for maximum deflection.
7.	"	"	108.5MC	"	Tuning gang fully open	"	A14	"
8.	"	"	87.5MC	"	Tuning gang fully closed	"		Retouch A13 for maximum deflection. Repeat steps 7 and 8 until no further improvement is obtained.
9.	"	"	106MC	"	Tune to 106MC signal	"	A15	Adjust for maximum deflection while rocking tuning gang.
10.	"	"	90MC	"	Tune to 90MC signal	"	A16	"

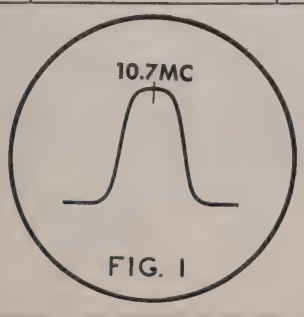


FIG. 1

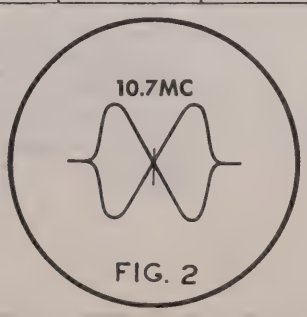
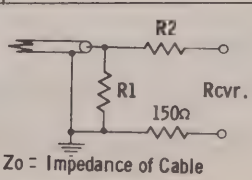


FIG. 2



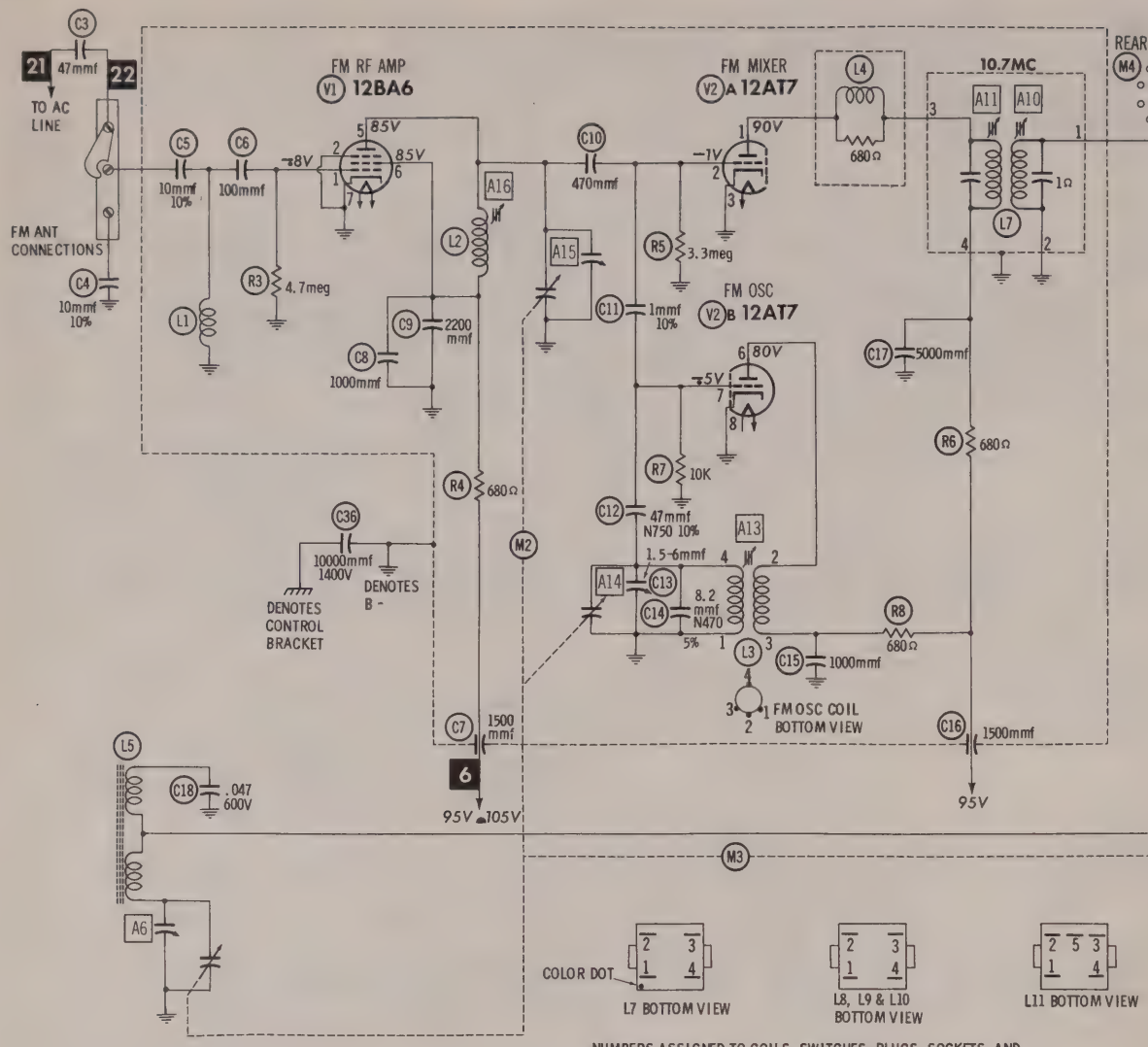
Zo = Impedance of Cable

Zo	R1	R2
50Ω	56Ω	120Ω
75Ω	82Ω	110Ω

FIG. 3

AIRLINE MODEL GTM-1666A

FOLDER 3



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12BA6	4.7meg	0Ω	72Ω	60Ω	†1700Ω	†1700Ω	0Ω		
V2	12AT7	†1700Ω	3.3meg	0Ω	48Ω	60Ω	†1700Ω	10K	0Ω	54Ω
V3	12AU6	1.2meg	0Ω	48Ω	36Ω	†1700Ω	†1700Ω	47Ω ▪2Ω		
V4	12BA6	2.7meg	0Ω	36Ω	24Ω	†1700Ω	†1700Ω	47Ω		
V5	12AL5	INF	INF	12Ω	24Ω	0Ω	0Ω	22K		
V6	12AV6	4.7meg	0Ω	0Ω	12Ω	520K	0Ω	†470K		
V7	50C5	180Ω	470K	72Ω	110Ω	470K	†1000Ω	†230Ω		

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
† MEASURED FROM OUTPUT OF M1.
▪ MEASURED IN "AM" POSITION.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
with CIRCUITRACE

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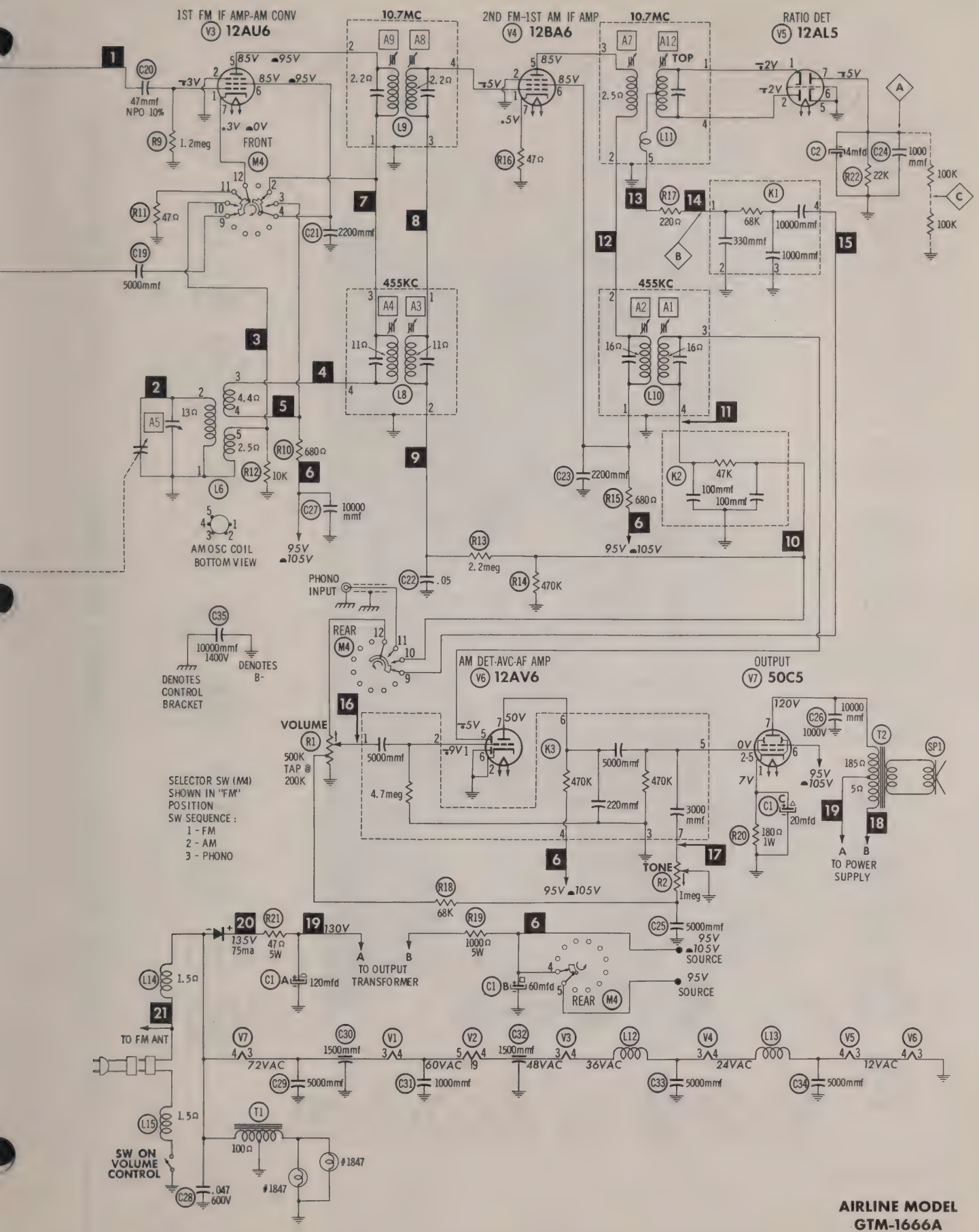
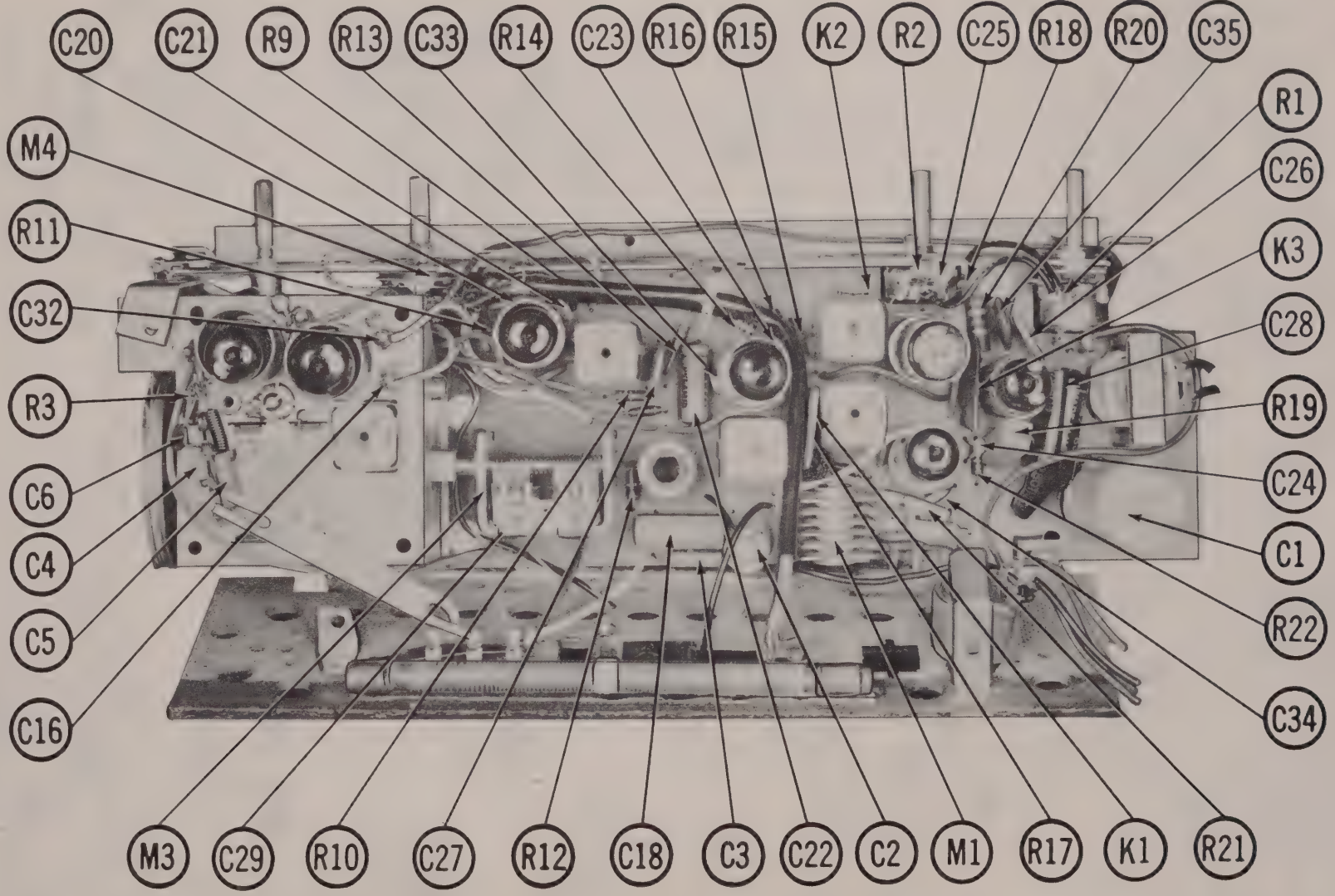


AIRLINE MODEL
GTM-1666A



CHASSIS TOP VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	FM RF Amplifier	12BA6	V4	2nd FM IF Amp. - 1st AM IF Amplifier	12BA6
V2	FM Mixer - FM Osc.	12AT7	V5	Ratio Detector	12AL5
V3	1st FM IF Amplifier-AM Converter	12AU6	V6	AM Det. - AVC - AF Amp.	12AV6
			V7	Output	50C5

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA AIRLINE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲120	165	218V033H02						
B	■60	165							
C	▲20	25							
C2	4	50	218V012H13	PRS1400	BBR4-50	TT50X4	TD-4-50	TVA-1402	

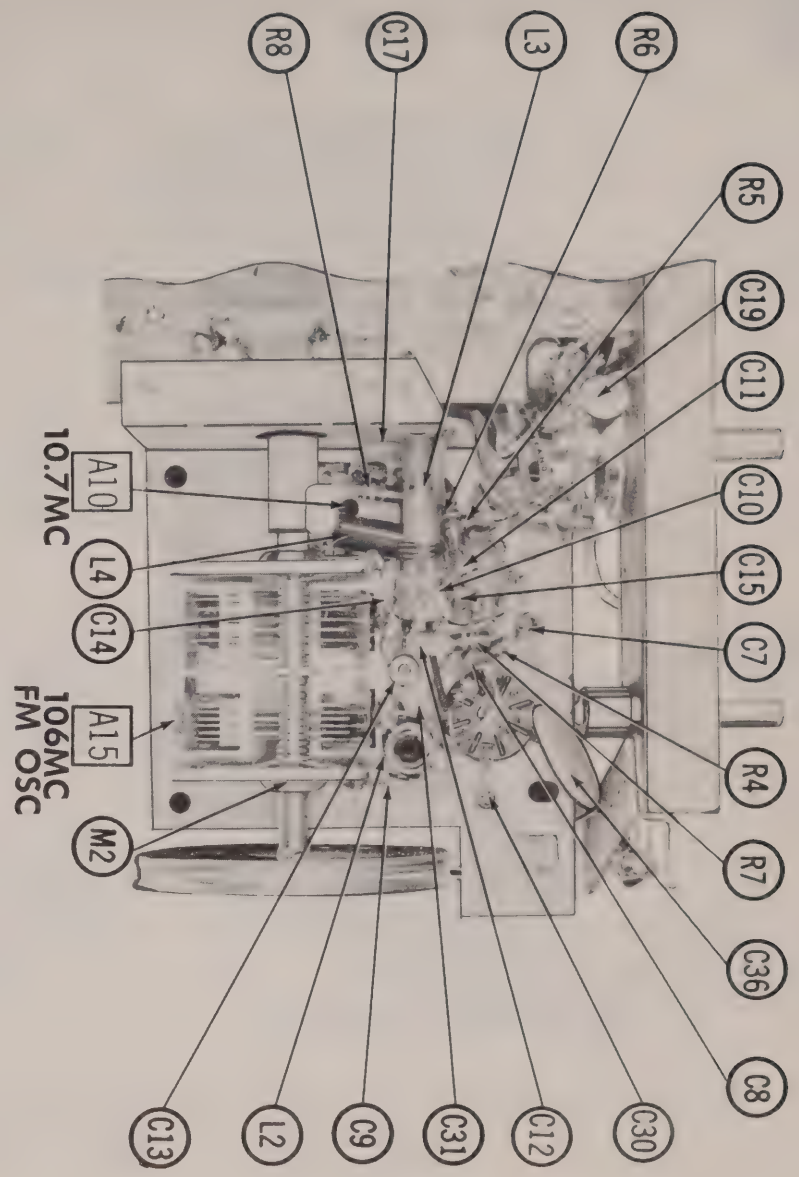
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	47		1468-000047	D6-470	5W5Q47	CM-20B-470M	CNO-47	1FM-447
C4	10 10%		1469-00001	D6-100	22R5Q1	CM-20B-100K	MCB215	MS-410
C5	10 10%		1469-00001	D6-100	22R5Q1	CM-20B-100K	MCB215	MS-410
C6	100		BPD-0001	DD-101	L10T1	CCD-101 CCF-102	UC-531	5GA-T10
C7	1500	#219V025H02						
C8	1000		BPD-001	DD-102	BYA10D1M	CCD-102	B-210	5HK-D10
C9	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-222	5HK-D22
C10	470		BPD-00047	DD-471	BYA10T47	CCD-471	B-347	5GA-T47
C11	1 10%		NPO-SI 1.0	TCZ-1			CNO-510	10TCC-V10
C12	47 N750 10%		N750-DI 47	DTN-47	C10Q47U	CCTN-471	CN7-447	10TCU-Q47
C13	1.5-6	#215V307H01		829-6		*		
C14	8.2 N470 5%	#215V300H46						
C15	1000		BPD-001	DD-102	BYA10D1M	CCD-102 CCF-152	B-210	5HK-D10
C16	1500	#219V025H02						
C17	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C18	.047 600V		P688N-047	DF-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C19	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C20	47 NPO 10%		NPO-DI 47	DTZ-47	C10Q47C	CCTO-470	CNO-447	10TCC-Q47
C21	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-222	5HK-D22
C22	.05 200V		P288N-05	DF-503	CUB2S5	4DP-3-503	GEM-415	2TM-S5
C23	2200		BPD-0022	DD-222	BYA10D22	CCD-222	B-222	5HK-D22
C24	1000		BPD-001	DD-102	BYA10D1M	CCD-102	B-210	5HK-D10
C25	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C26	10000 1000V		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C27	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C28	.047 600V		P688N-047	DF-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C29	5000		BPD-005	DD-502	BYA10D5	CCD-502 CCF-152	B-250	5HK-D50
C30	1500	#219V025H02						
C31	1000		BPD-001	DD-102	BYA10D1	CCD-102 CCF-152	B-210	5HK-D10
C32	1500	#219V025H02						
C33	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C34	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C35	10000 1400V		DAC-27	DD16-103	HVE16S1	16DP-3-103	2HV-110	BL-S10
C36	10000 1400V		DAC-27	DD16-103	HVE16S1	16DP-3-103	2HV-110	BL-S10

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
# Airline Part Number.

FM RF SUB CHASSIS



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	AIRLINE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	270V039H09				PP55T25	Volume
	200K Tap						Not Req.	Push-Pull Off-On
B	Switch							Tone
R2A	1meg	½	270V039H10	B-69	A47-1meg-S	Q11-137	U54	
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	4.7meg	
R4	680Ω	
R5	3.3meg	
R6	680Ω	
R7	10K	
R8	680Ω	
R9	1.2meg	

ITEM No.	RATING	REMARKS
R10	680Ω	
R11	47Ω	
R12	10K	
R13	2.2meg	
R14	470K	
R15	680Ω	
R16	47Ω	

ITEM No.	RATING	REMARKS
R17	220Ω	
R18	68K	
R19	1000Ω 5W	
R20	180Ω 1W	
R21	47Ω 5W	#251V023H23
R22	22K	

Airline Part Number.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		AIRLINE PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	FM Antenna Coil	230V065H01						
L2	FM RF Coil	230V045H01						
L3	FM Osc. Coil	230V045H02						
L4	RF Choke	230V056H18						Wound on 680Ω
L5	Loopstick	787V161H01						
L6	AM Osc. Coil	230V044H01						
L7	1st FM IF Trans.	235V039H01	16-3490	16-3490		1463-PC		
L8	1st AM IF Trans.	235V044H01	16-6780	16-6780	BC-356	13-PC1	RF-4	
L9	2nd FM IF Trans.	235V037H02	16-3490	16-3490		1463-PC		
L10	2nd AM IF Trans.	235V038H02	16-6780	16-6780	BC-357	13-PC2	RF-4	
L11	Ratio Detector	235V035H01						
L12	Fil. Choke	230V056H02	19-1000	19-1000	BC-561	4602		1.1uh
L13	Fil. Choke	230V056H02	19-1000	19-1000	BC-561	4602		1.1uh
L14	Line Choke	V-9099-5			SW-630			2.7uh
L15	Line Choke	V-9099-5			SW-630			2.7uh

TRANSFORMER (FILAMENT)

ITEM No.	RATING		REPLACEMENT DATA						
	PRI.	SEC. 2	AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .030A Tap @ 6.3V @ .2A		430V075H01						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	2300Ω Tap @ 3%	3-4Ω	430V062H01							

SPEAKER

ITEM No.		TYPE		REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	AIRLINE PART No.	QUAM PART No.	
SP1	10" x 2 5/8"	PM	3-4Ω	570V024H01		

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	AIRLINE PART No.	REPLACEMENT DATA
K1	De-emphasis	330mmf, 1000mmf, 10000mmf, 68K	219V020H01	
K2	AM Diode RF Filter	100mmf, 100mmf, 47K	219V022H01	Centralab PC-50
K3	Audio Coupling	220mmf, 3000mmf, 5000mmf, 5000mmf, 470K, 470K, 4.7meg	219V019H01	

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	AIRLINE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.074A	295V012H01 ①	1235AH ①	T100 ①	100A ①	SR200 ②	① Selelnium Type ② Silicon Type

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M2	Tuning Cap.	330V015H06	FM, 2 Gang
M3	Tuning Cap.	330V016H02	AM, 2 Gang
M4	Switch	756V027H02	Selector

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	550V082H01	FM-AM Tuning, Volume, Tone
Knob	550V082H05	Selector
Pointer	558V089H01	
Dial	558V118H02	
Background Bracket	559V036H02	Assembly, Includes AM-FM Scale
Cabinet Back	513V017H19	
Cabinet Front	558V145H01	

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

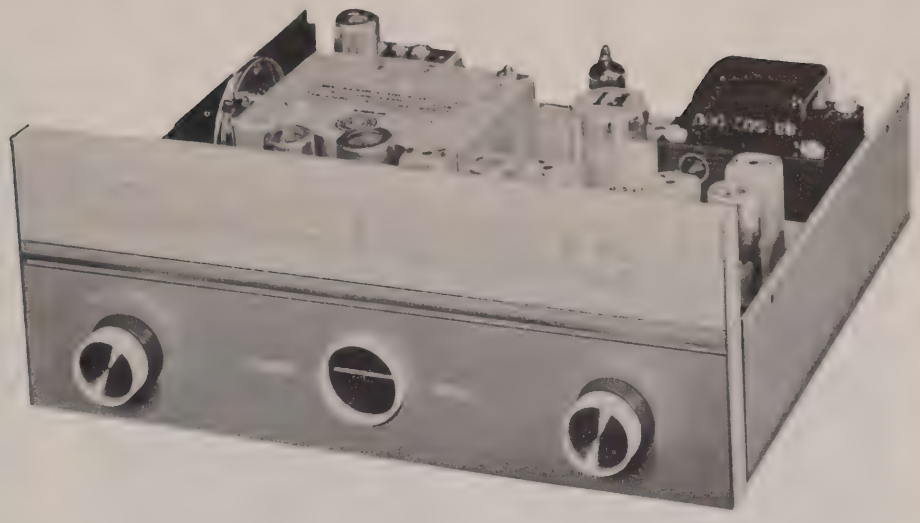
Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

PHOTOFACT* Folder

EIA MEMBER

BOGEN MODEL FM51

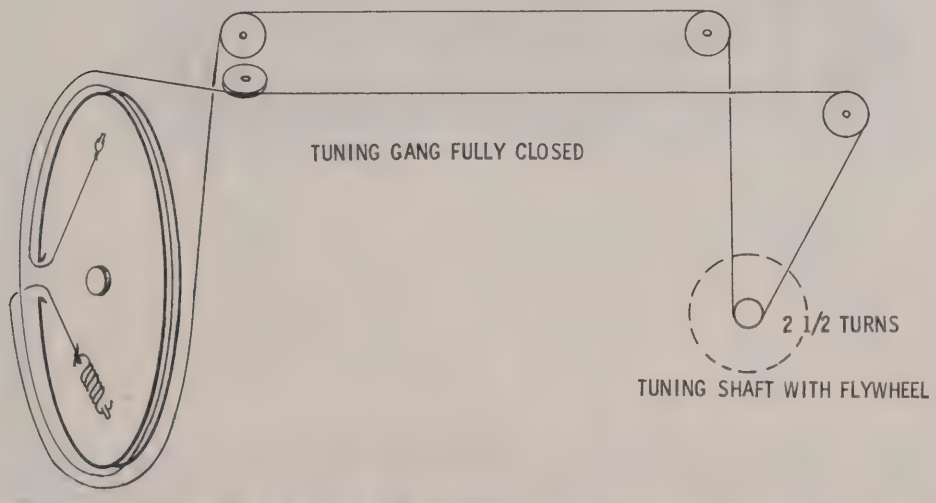
BOGEN MODEL FM51



BOGEN MODEL FM51

TRADE NAME	Bogen Model FM 51
MANUFACTURER	Bogen-Presto Co., A Div. of The Siegler Corp., P.O. Box 500, Paramus, N. J.
TYPE SET	AC Operated 8 Tube FM Tuner
POWER SUPPLY	110-120 Volts AC, 60 Cycles
RATING	35 Watts, .35 Amp. @117 Volts AC
TUNING RANGE— FREQ. MOD.	88— 108MC

DIAL CORD STRINGING



HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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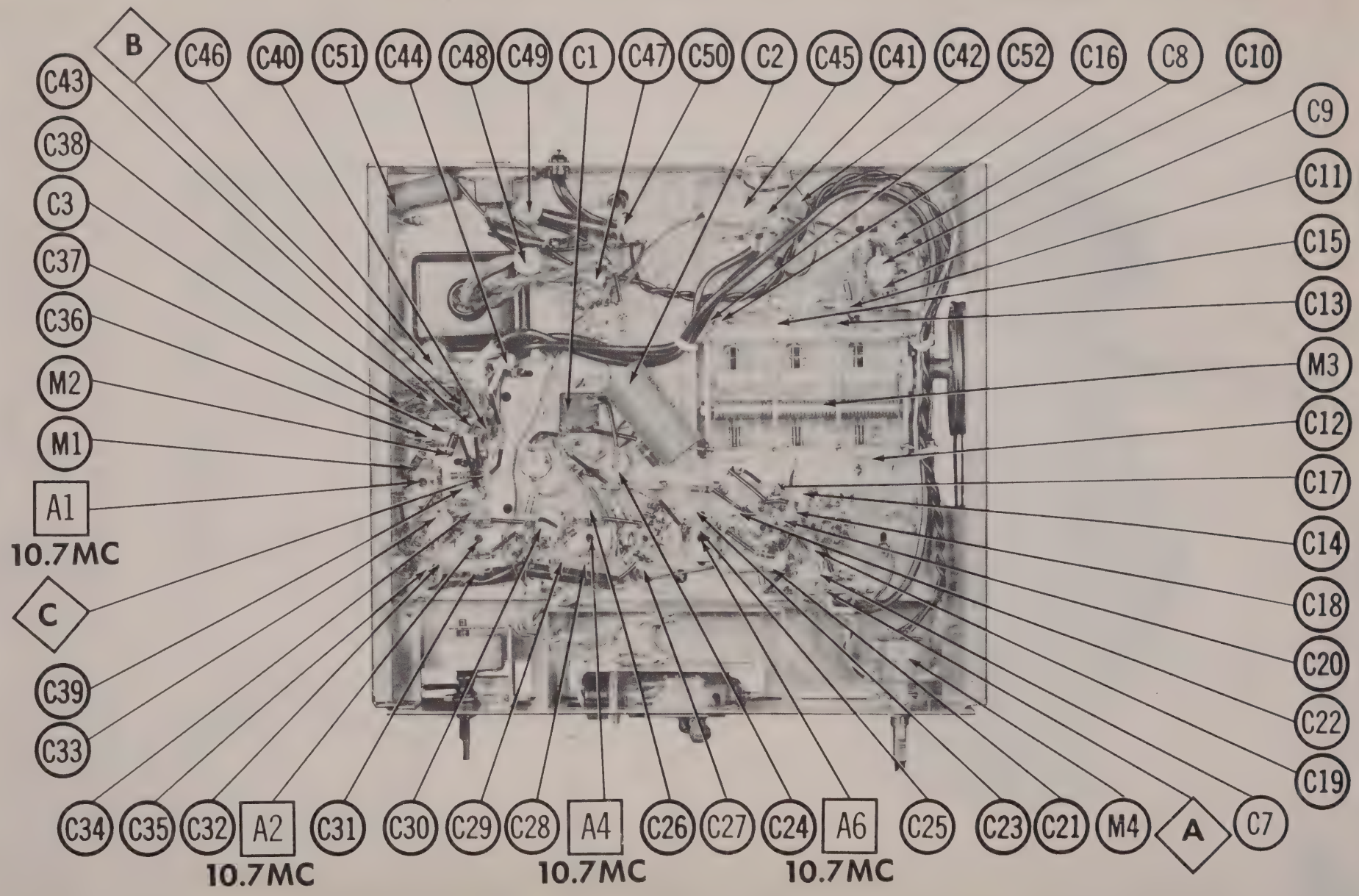
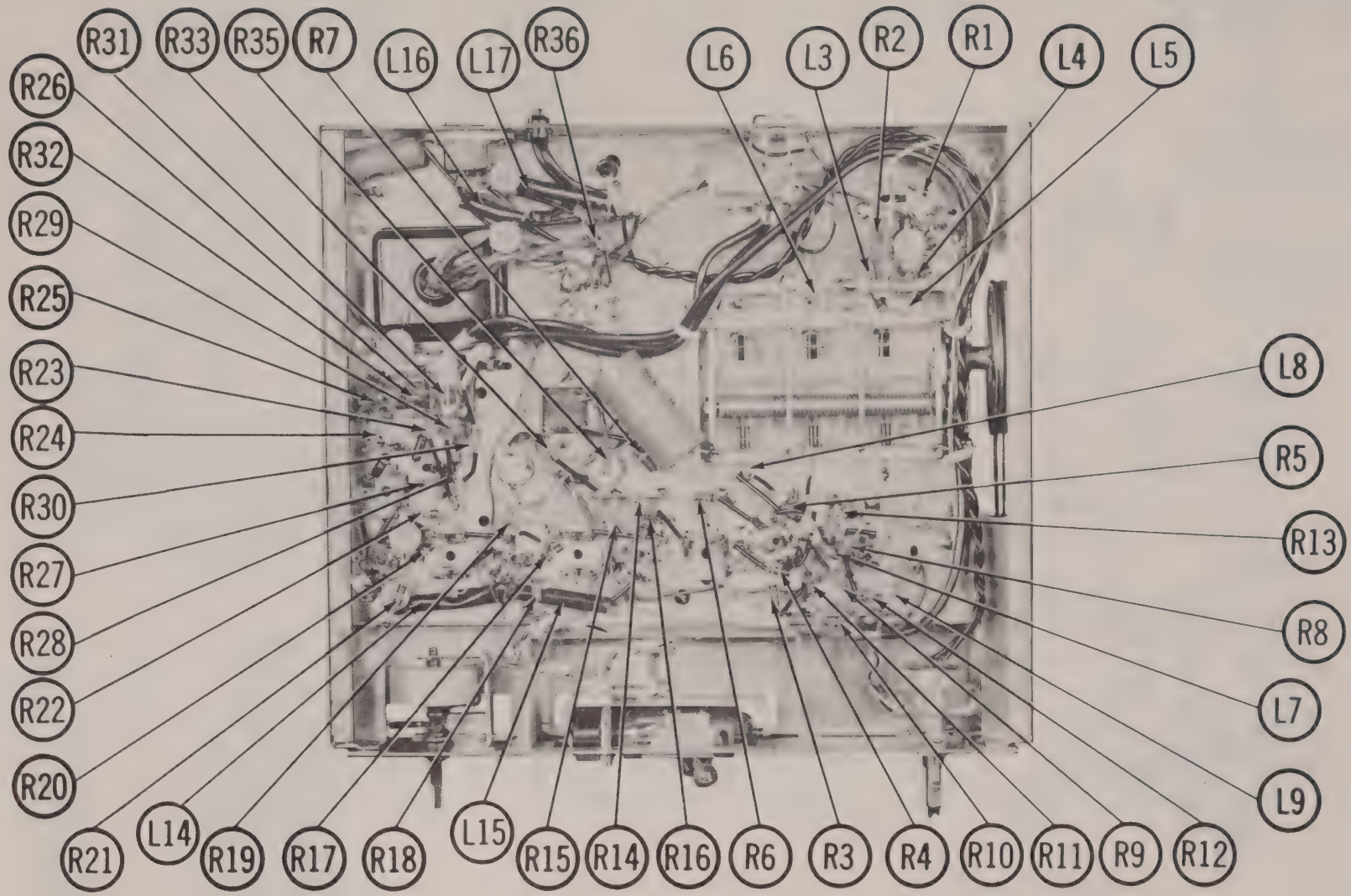
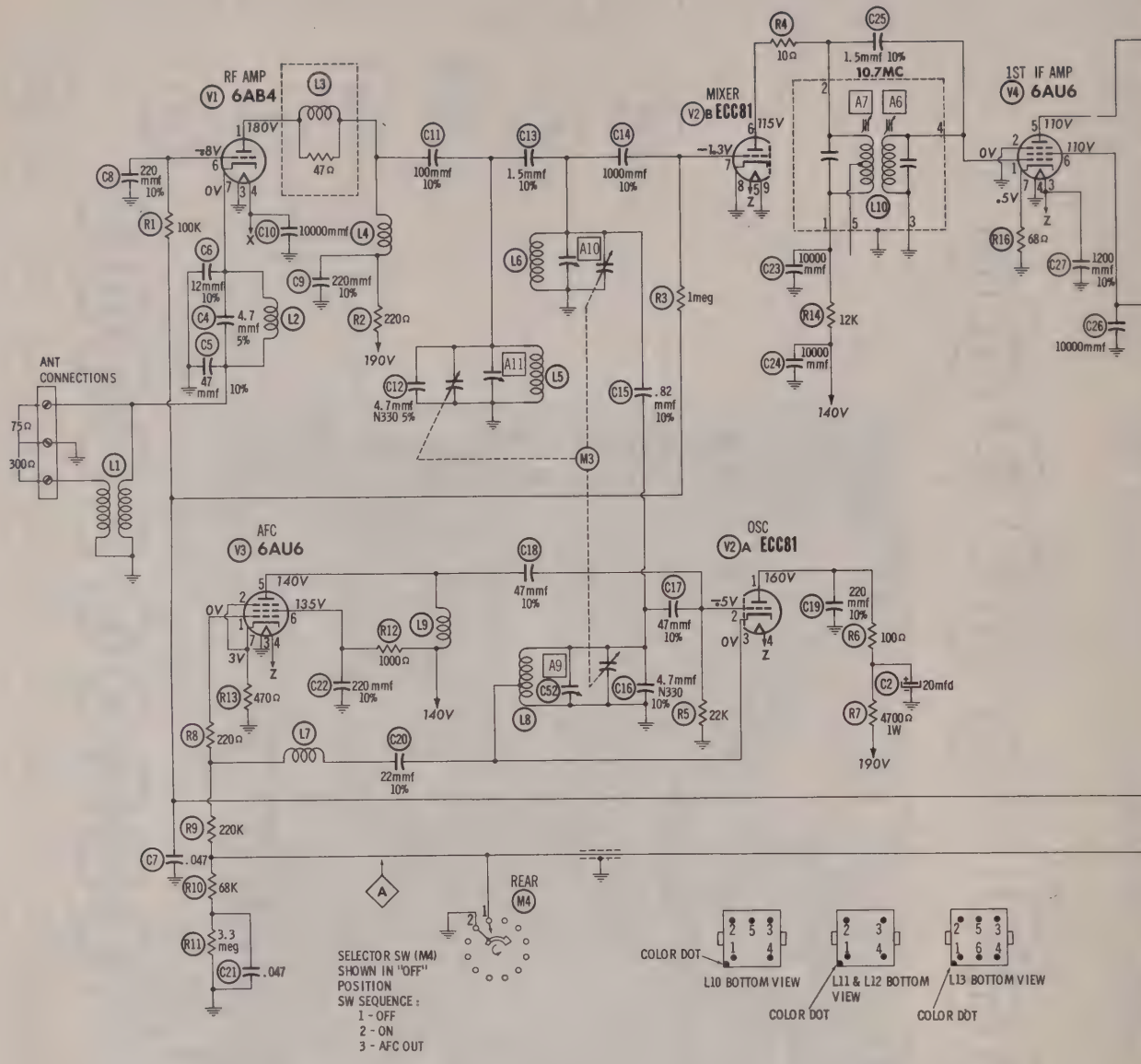


CHASSIS BOTTOM VIEW - ALIGNMENT, CAPACITOR & MISC. IDENT.



CHASSIS BOTTOM VIEW - RESISTOR & INDUCTOR IDENT.



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AB4	†720Ω	0Ω	0Ω	.1Ω	0Ω	550K	.1Ω		
V2	ECC81 12AT7	†5300Ω	22K	0Ω	.1Ω	.1Ω	†13K	1.5meg	0Ω	0Ω
V3	6AU6	3.5meg ▲ 220K	470Ω	0Ω	.1Ω	†1700Ω	†2700Ω	470Ω		
V4	6AU6	.8Ω	0Ω	.1Ω	0Ω	†5000Ω	†5000Ω	68Ω		
V5	6AU6	120K	0Ω	.1Ω	0Ω	†4800Ω	†4800Ω	0Ω		
V6	6AU6	100K	0Ω	.1Ω	0Ω	†40K	†40K	0Ω		
V7	EM840	480K	NC	0Ω	0Ω	.1Ω	†500Ω	†470K	NC	†470K
V8	6X4	228Ω	NC	0Ω	.1Ω	TP	218Ω	¶		

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 7 OF V8
NC NO CONNECTION
TP TIE POINT
▲ MEASURED IN "AFC-OUT" POSITION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. No signal applied for voltage measurements.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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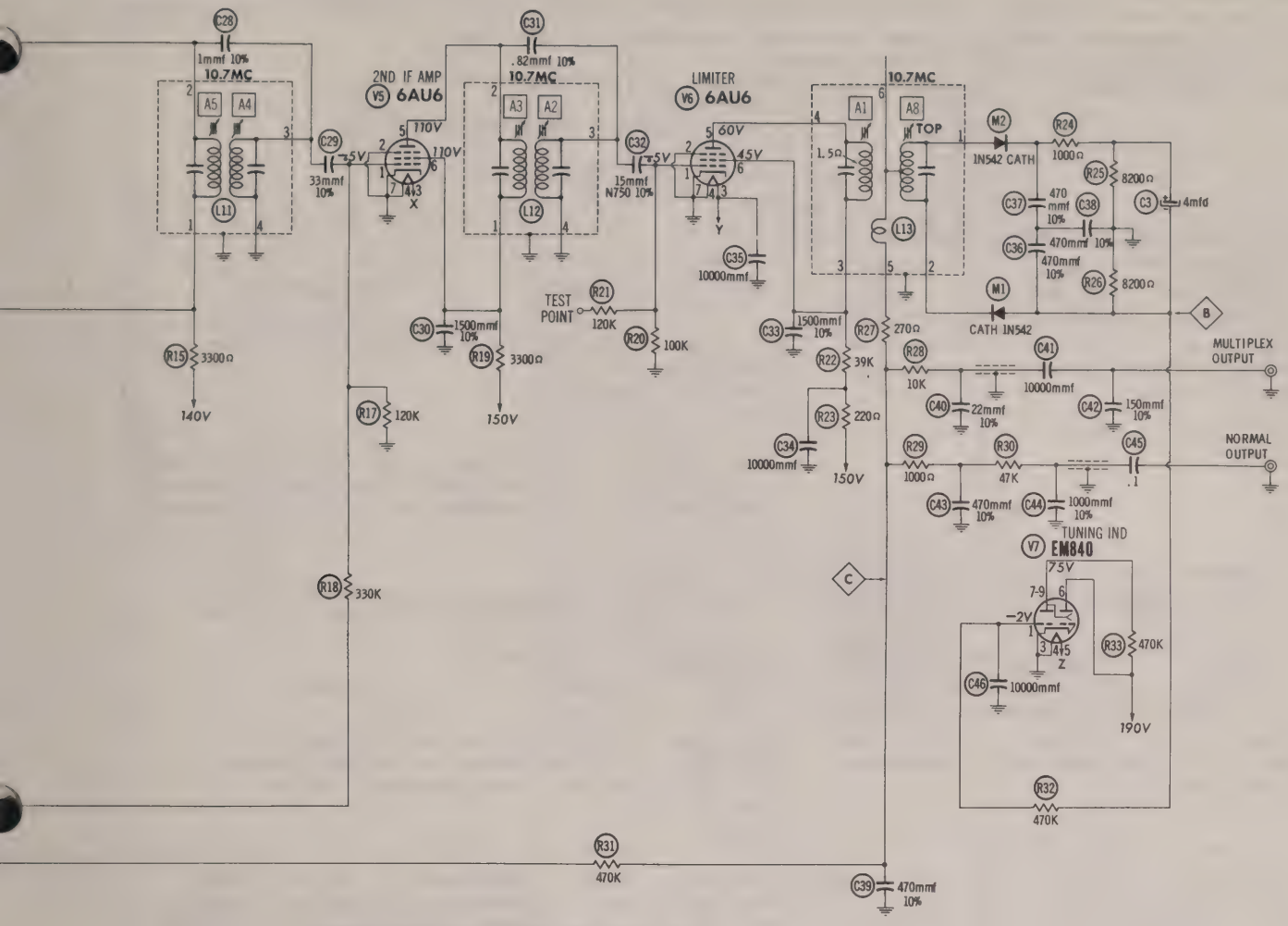
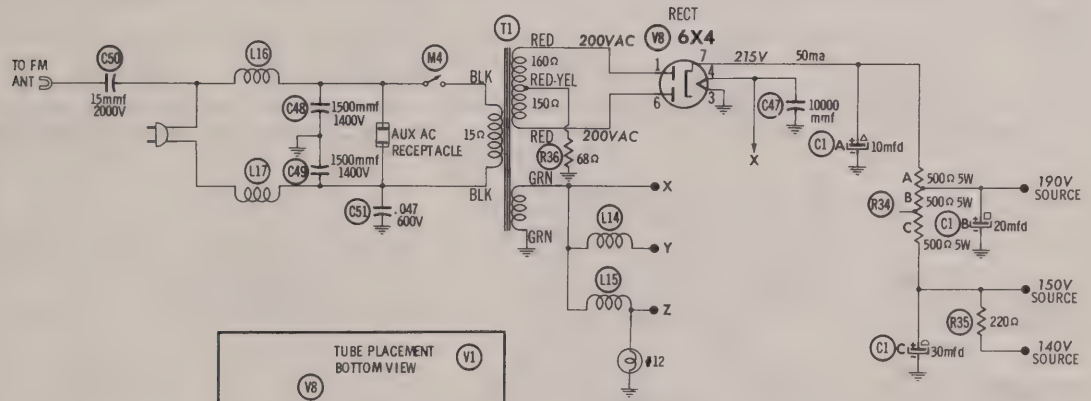
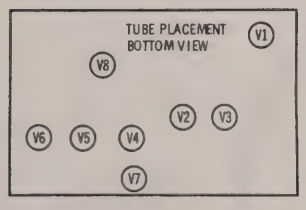


NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.





BOGEN MODEL FM51

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Output of signal generator should be no higher than necessary to obtain an output reading.
Connect a clip lead from point (A) to chassis to ground AFC.
Suggested alignment tools:

A1 thru A8..... GENERAL CEMENT #5097, 8727
WALSCO #2515
A9, A10..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A11..... GENERAL CEMENT #8721, 8722
WALSCO #2519

IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	High side thru .01mfd to pin 7 (grid) of Mixer. Low side to chassis.	10.7MC (Unmod.)	Point of non-interference	DC probe to point (B). Common to Chassis.	A1, A2, A3, A4, A5, A6, A7	Adjust for maximum deflection.
2.	"	"	"	DC probe to point (C). Common to chassis.	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1.	High side thru .01mfd to Pin 7 (grid) of Mixer. Low side to chassis.	10.7MC (450KC Swp)	Point of non-interference.	Vert. amp. thru 10K to point (B). Low side to chassis.	A1, A2, A3, A4, A5, A6, A7	Disconnect stabilizer Cap. C3. Adjust for maximum gain and symmetry similar to Fig. 1.
2.	"	"	"	Vert. amp. thru 10K to point (C). Low side to chassis.	A8	Reconnect C3. Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A1 for maximum amplitude and straightness of crossover lines.

RF ALIGNMENT

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
3.	Thru dummy (Fig. 3) to FM antenna terminals.	104MC (Unmod.)	104MC	DC probe thru 100K to point (B). Common to chassis.	A9, A10, A11	Adjust for maximum deflection.
4.	"	90MC	90MC	"		Check tracking.

FIG. 1

FIG. 2

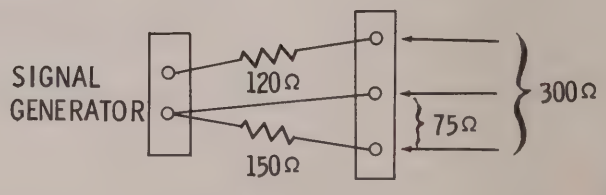


FIG. 3

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE (CBS / GENERAL ELECTRIC / RAYTHEON / SYLVANIA)
V1	RF Amplifier	6AB4
V2	Mixer-Osc.	ECC81/12AT7
V3	AFC	6AU6
V4	1st IF Amplifier	6AU6
V5	2nd IF Amplifier	6AU6
V6	Limiter	6AU6
V7	Tuning Indicator	EM840
V8	Rectifier	6X4

ELECTROLYTIC CAPACITORS

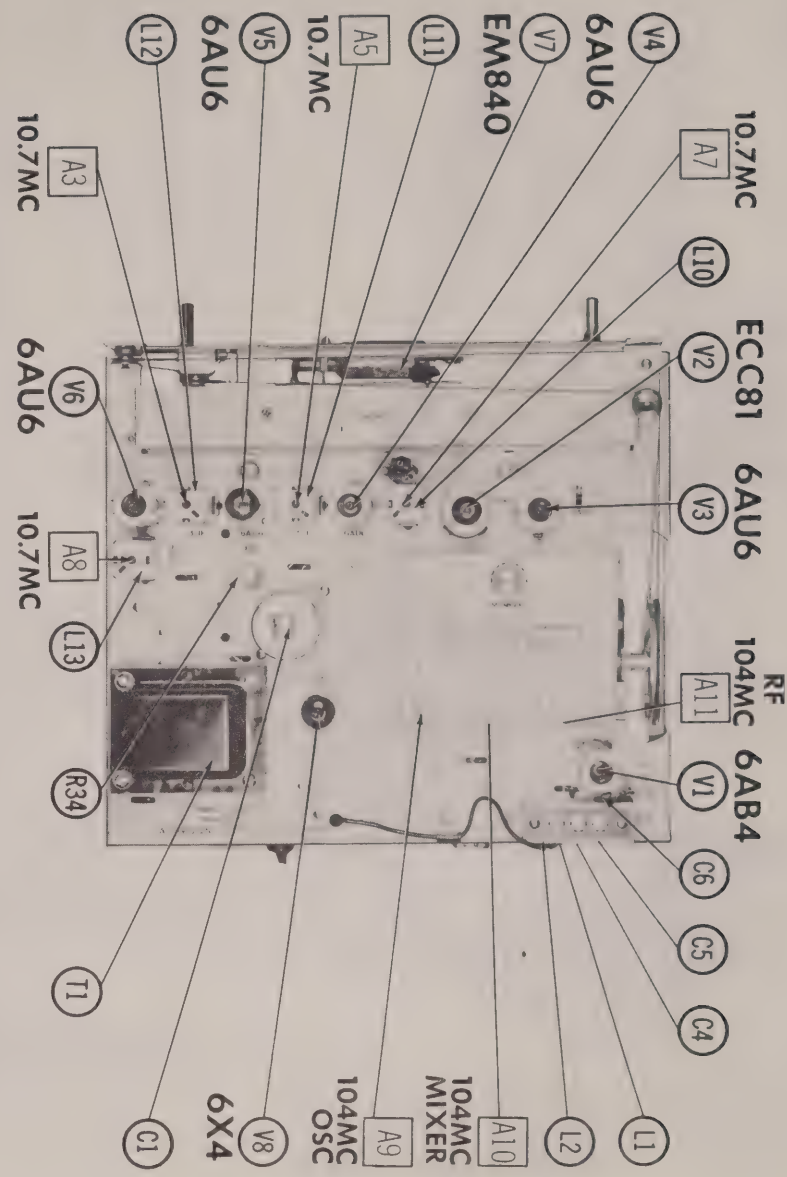
ITEM No.	RATING CAP.	RATING VOLT.	BOGEN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲10	350		AFH3-28-30	C1243	FP343.6	TMT-150	TVL-3639.8	
B	■20	350							
C	▲30	350							
C2	20	350		PRS1735	BR2035	TC65	TD-20-350	TVA-1608	
C3	4	15		TVA-1402	BBR4-50	TT50X4	TD-4-25	TVA-1402	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	4.7 5%		NPO-DI 4.7	DTZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C5	47 10%		DI-47	DD-470	L10Q47	CCD-470	CNO-447	10TS-Q47
C6	12 5%			DD-120	L10Q12	CCD-120	CNO-412	10TS-Q12
C7	.047 200V		P288N-047	DF-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C8	220 10%		DI-220	DD-221	L10T22	CCD-221	JL-322	10TS-T22
C9	220 10%		DI-220	DD-221	L10T22	CCD-221	JL-322	10TS-T22
C10	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C11	100 10%		DI-100	DD-101	L10T1	CCD-100	CNO-310	10TS-T10
C12	4.7 N330 5%					■		
C13	1.5 10%		NPO SI 1.5	TCZ-1R5	C10V15C		CNO-515	10TCC-V15
C14	1000 10%		DI-1000	DD-102	1R5D1	CCS-102	JL-210	10TS-D10
C15	.82 10%							
C16	4.7 N330 10%					■		
C17	47 10%		DI-47	DD-470	L10Q47	CCD-470	CNO-447	10TS-Q47
C18	47 10%		DI-47	DD-470	L10Q47	CCD-470	CNO-447	10TS-Q47
C19	220 10%		DI-220	DD-221	L10T22	CCD-221	JL-322	CCD-221
C20	22 10%		DI-22	DD-220	L10Q22	CCD-220	CNO-422	10TS-Q22
C21	.047 200V		P288N-047	DF-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C22	220 10%		DI-220	DD-221	L10T22	CCD-221	JL-322	10TS-T22
C23	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C24	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C25	1.5 10%		NPO-SI 1.5	TCZ-1R5	C10V15C		CNO-515	10TCC-V15
C26	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C27	1200 10%		DI-1200	DD-122	1R5D12	CCS-120	JL-212	10TS-D12
C28	1 10%		NPO-SI 1	TCZ-1			CNO-512	10TCC-V10
C29	33 10%		DI-33	DD-330	L10Q33	CCD-330	CNO-433	10TS-Q33
C30	1500 10%		DI-1500	DD-152	1R5D15	CCS-152	JL-215	10TS-D15
C31	.82 10%							
C32	15 N750 10%		N750-DI 15	DTN-15	C10Q15U	CCTN-150	CN7-415	10TCU-Q15
C33	1500 10%		DI-1500	DD-152	1R5D15	CCS-152	JL-215	10TS-D15
C34	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C35	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C36	470 10%		DI-470	DD-471	5R5T47	CCD-471	JL-347	10TS-T47
C37	470 10%		DI-470	DD-471	5R5T47	CCD-471	JL-347	10TS-T47

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C38	470 10%		DI-470	DD-471	5R5T47	CCD-471	JL-347	10TS-T47
C39	470 10%		DI-470	DD-471	5R5T47	CCD-471	JL-347	10TS-T47
C40	22 10%		DI-22	DD-220	L10Q22	CCD-220	CNO-422	10TS-Q22
C41	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C42	150 10%		DI-150	DD-151	L10T15	CCD-151	JL-315	10TS-T15
C43	470 10%		DI-470	DD-471	5R5T47	CCD-471	JL-347	10TS-T47
C44	1000 10%		DI-1000	DD-102	1R5D1	CCS-102	JL-210	10TS-D10
C45	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C46	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C47	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C48	1500 1400V		HVD-15-1500	DD30-152	HVB20D15	16DP-1-152	2HV-215	30GA-D15
C49	1500 1400V		HVD-15-1500	DD30-152	HVB20D15	16DP-1-152	2HV-215	30GA-D15
C50	15 2000V		HVD-30-15	DD30-150	HVA20Q15	VCM-20-150M	2DY-415	30GA-Q15
C51	.047 600V		P688N-047	DF-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47
C52								

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	BOGEN PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ⓐ .35A	400 VCT ⓐ .050A	6.3V ⓐ 2.7A	83-507-000						

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		BOGEN PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M1	1N542		1N636		1N295	Ratio Det. (Pigtail)
M2	1N542		1N636		1N295	Ratio Det. (Pigtail)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R1	100K	
R2	220Ω	
R3	1meg	
R4	10Ω	
R5	22K	
R6	100Ω	
R7	4700Ω 1W	
R8	220Ω	
R9	220K	
R10	68K	
R11	3.3meg	
R12	1000Ω	

ITEM No.	RATING	REMARKS
R13	470Ω	
R14	12K	
R15	3300Ω	
R16	68Ω	
R17	120K	
R18	330K	
R19	3300Ω	
R20	100K	
R21	120K	
R22	39K	
R23	220Ω	
R24	1000Ω	

ITEM No.	RATING	REMARKS
R25	8200Ω	
R26	8200Ω	
R27	270Ω	
R28	10K	
R29	1000Ω	
R30	47K	
R31	470K	
R32	470K	
R33	470K	
R34A	500Ω 5W	
B	500Ω 5W	
C	500Ω 5W	
R35	220Ω	
R36	68Ω	

MISCELLANEOUS

ITEM No.	PART NAME	BOGEN PART No.	NOTES
M3	Tuning Cap.	C639A	3 Gang
M4	Switch	S528	Off-On-AFC Defeat

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		BOGEN PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Ant. Trans.	U452						1uh
L2	Ant. Coil	U451	19-1000	19-1000	BC-561	4602		①
L3	RF Choke	U514						
L4	RF Choke	U420	19-1001	19-1001	BC-562	4604		1.7uh
L5	RF Coil	U477						
L6	Mixer Coil	U478						
L7	RF Choke	U432	19-1000	19-1000	BC-561	4602		1.1uh
L8	Osc. Coil	U435						3.3uh②
L9	RF Choke	U507						
L10	1st IF Trans.	H615	16-3487	16-3487	FM-254	1463		
L11	2nd IF Trans.	H355	16-3487	16-3487	FM-254	1463		
L12	3rd IF Trans.	H355	16-3487	16-3487	FM-254	1463		
L13	Ratio Detector	H387	17-3498	17-3498	FM-255	1465		
L14	Fil. Choke	U512						1.9uh
L15	Fil. Choke	U512						1.9uh
L16	Line Choke	U512						1.9uh
L17	Line Choke	U512						1.9uh

① 3 turns wire wound on 47Ω resistor.
② IRC Part # CLA.

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

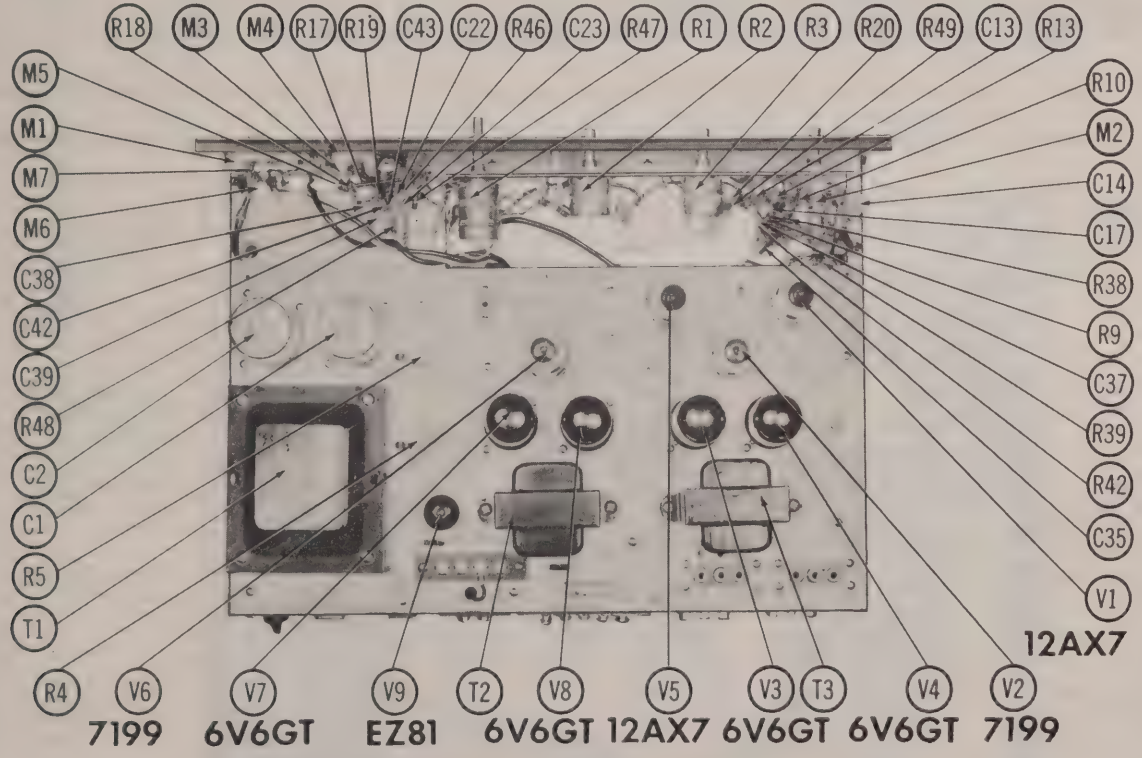
PHOTOFACT* Folder

EIA MEMBER

CHALLENGER
MODEL AC210A

CHALLENGER
MODEL AC210A

TRADE NAME	Challenger Model AC210A
MANUFACTURER	Bogen-Presto Co., A Div. of the Siegler Corp., P.O. Box 500, Paramus, N. J.
TYPE SET	AC Operated 9 Tube Stereo Amplifier
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 92 Watts, .9 Amp. @117 Volts AC



CHALLENGER
MODEL AC210A

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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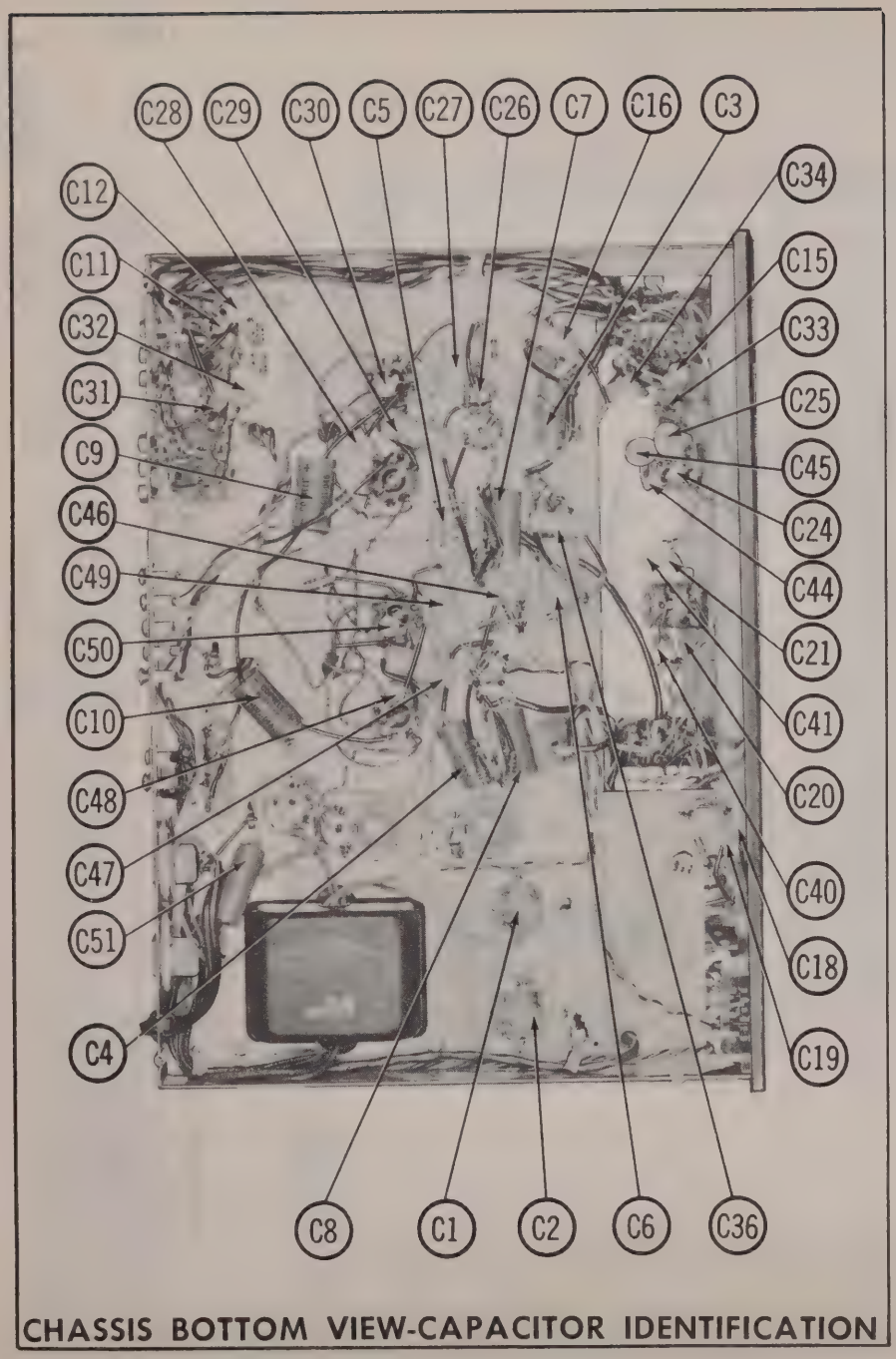
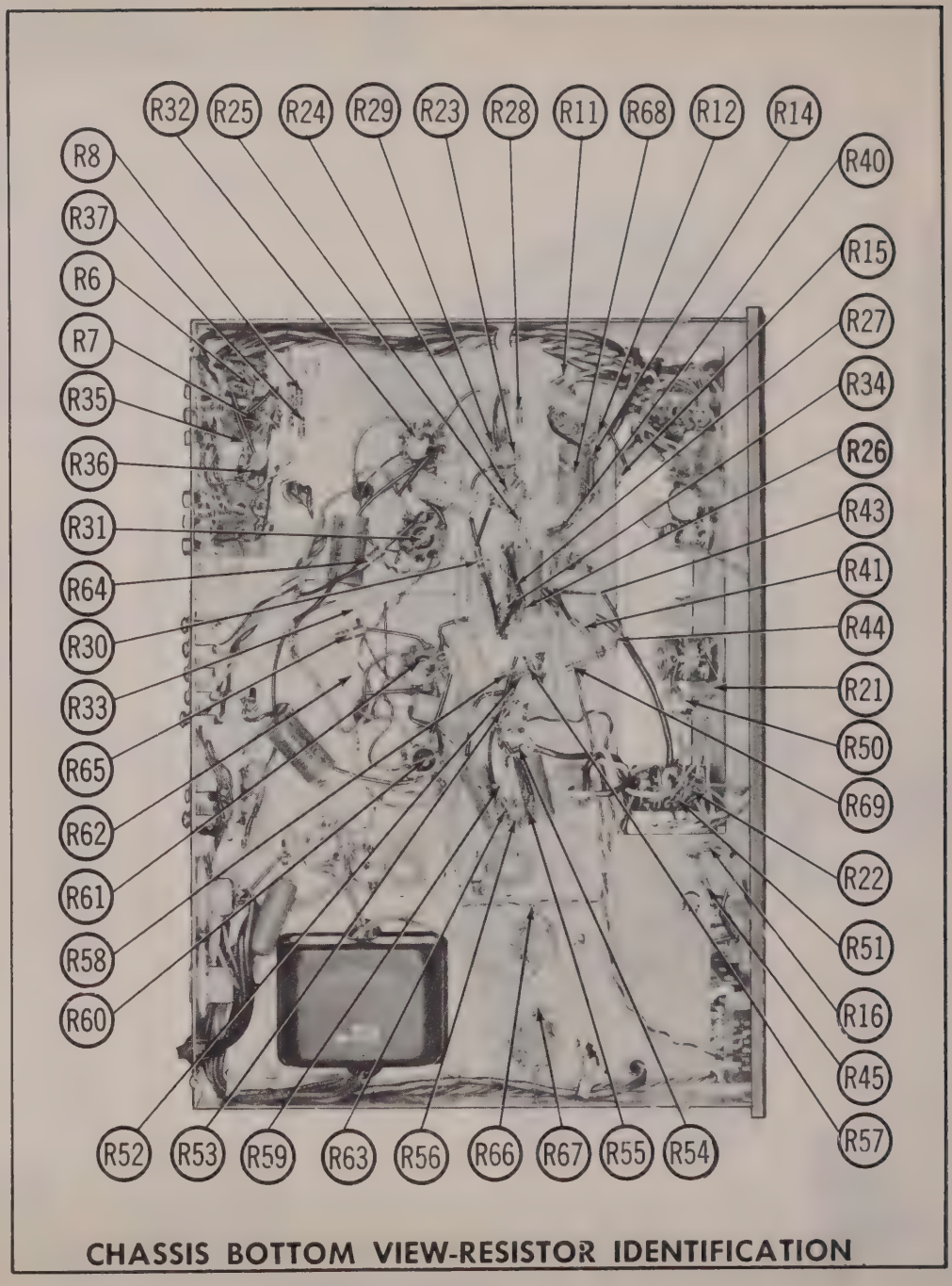


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE (CBS / GENERAL ELECTRIC / RAYTHEON / SYLVANIA)
V1	Channel 1 Tape & Phono. Preamp.	ECC83/12AX7 (7025) *
V2	Channel 1 AF Amp. - Channel 1 Phase Inv.	7199
V3	Channel 1 Output	6V6GT
V4	Channel 1 Output	6V6GT
V5	Channel 2 Tape & Phono. Preamp.	ECC83/12AX7 (7025) *
V6	Channel 2 AF Amp. - Channel 2 Phase Inv.	7199
V7	Channel 2 Output	6V6GT
V8	Channel 2 Output	6V6GT
V9	Rectifier	EZ81/6CA4

* Alternate

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA: CHALLENGER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲30	350	79-010-003	AFH3-28-30	C0225	FP343.6	TMT-124	TVL-3639.8	
B	■20	350							
C	▲10	350							
C2A	▲30	350	79-010-003	AFH3-28-30①	C0225	FP343.6	TMT-124	TVL-3639.8	
B	■20	350							
C	▲10	350							
C3	5	200	79-001-086	PRS1550	BBR4-250	TC50X	TD-4-450	TVA-1501	
C4	5	200	79-001-086	PRS1550	BBR4-250	TC50X	TD-4-450	TVA-1501	
C5	5	200	79-001-086	PRS1550	BBR4-250	TC50X	TD-4-450	TVA-1501	
C6	5	200	79-001-086	PRS1550	BBR4-250	TC50X	TD-4-450	TVA-1501	
C7	100	6	79-001-026	PRS1100	BBR100-6	TC2501	TD-100-6	TVA-1101	
C8	100	6	79-001-026	PRS1100	BBR100-6	TC2501	TD-100-6	TVA-1101	
C9	10	25	79-001-046	PRS1250	BBR10-25	TC22	TD-10-25	TVA-1204	
C10	10	25	79-001-046	PRS1250	BBR10-25	TC22	TD-10-25	TVA-1204	

① Use MW-4 washer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C11	22 10%	①	DI-22	DD-220	L10Q22	CCD-220	CNO-422	10TS-Q22
C12	2200 10%		DI-2200		PM6D22	CCS-222	JL-222	10TS-D22
C13	270 10%		DI-270	DD-271	L10T27	CCD-271		10TS-T27
C14	.022 200V		P288N-022		CUB4S22	4DP-2-223	GEM-4122	2TM-S22
C15	.022 200V		P288N-022		CUB4S22	4DP-2-223	GEM-4122	2TM-S22
C16	.022 200V		P288N-022		CUB4S22	4DP-2-223	GEM-4122	2TM-S22
C17	1000 10%		DI-1000	DD-102	PM6D1	CCS-102	JL-210	10TS-D10
C18	4700 10%		DI-4700		PM6D47	CCS-472	JL-247	10TS-D47
C19	4700 10%		DI-4700		PM6D47	CCS-472	JL-247	10TS-D47
C20	470 10%		DI-470	DD-471	22R5T47	CCD-471	JL-347	10TS-T47
C21	1800 10%		DI-1800	DD-182	PM6D2	CCS-182	JL-218	10TS-D18
C22	330 10%		DI-330	DD-331	L10T33	CCD-331	JL-333	10TS-T33
C23	150 10%		DI-150	DD-151	L10T15	CCD-151	JL-315	10TS-T15
C24	680 10%		DI-680	DD-681	1R5T68	CCS-681	JL-368	10TS-T68
C25	3300 10%		DI-3300		PM6D33	CCS-332	JL-233	10TS-D33
C26	22 10%		DI-22	DD-220	L10Q22	CCD-220	CNO-422	10TS-Q22
C27	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C28	820 10%			DD-821	1R5T82	CCS-821	JL-382	10TS-T82
C29	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C30	820 10%			DD-821	1R5T82	CCS-821	JL-382	10TS-T82
C31	22 10%	①	DI-22	DD-220	L10Q22	CCD-220	CNO-422	10TS-Q22
C32	2200 10%		DI-2200		PM6D22	CCS-222	JL-222	10TS-D22
C33	270 10%		DI-270	DD-271	L10T27	CCD-271		10TS-T27
C34	.022 200V		P288N-022		CUB4S22	4DP-2-223	GEM-4122	2TM-S22
C35	.022 200V		P288N-022		CUB4S22	4DP-2-223	GEM-4122	2TM-S22
C36	.022 200V		P288N-022		CUB4S22	4DP-2-223	GEM-4122	2TM-S22
C37	1000 10%		DI-1000	DD-102	PM6D1	CCS-102	JL-210	10TS-D10
C38	4700 10%		DI-4700		PM6D47	CCS-472	JL-247	10TS-D47
C39	4700 10%		DI-4700		PM6D47	CCS-472	JL-247	10TS-D47
C40	470 10%		DI-470	DD-471	22R5T47	CCD-471	JL-347	10TS-T47

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C41	1800 10%		DI-1800	DD-182	PM6D2	CCS-182	JL-218	10TS-D18
C42	330 10%		DI-330	DD-331	L10T33	CCD-331	JL-333	10TS-T33
C43	150 10%		DI-150	DD-151	L10T15	CCD-151	JL-315	10TS-T15
C44	680 10%		DI-680	DD-681	1R5T68	CCS-681	JL-368	10TS-T68
C45	3300 10%		DI-3300		PM6D33	CCS-332	JL-233	10TS-D33
C46	22 10%		DI-22	DD-220	L10Q22	CCD-220	CNO-422	10TS-Q22
C47	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C48	820 10%			DD-821	1R5T82	CCS-821	JL-382	10TS-T82
C49	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C50	820 10%			DD-821	1R5T82	CCS-821	JL-382	10TS-T82
C51	.047 600V		P688N-047	DF-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47

① Not used in some versions.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: CHALLENGER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	5meg *		77-001-455					Balance
B	1meg							Volume, Channel 1
C	1meg							Volume, Channel 2
R2A	1meg		77-001-446	B-70	AD47-1meg-Z	Q13-137		Treble, Channel 1
B	1meg			SR-70	Not Req.	M13-137	■ UE3913	Treble, Channel 2
C	Shaft			Not Req.	FS-3	Not Req.		
R3A	1meg		77-001-446	B-70	AD47-1meg-Z	Q13-137		Bass, Channel 1
B	1meg			SR-70	Not Req.	M13-137	■ UE3913	Bass, Channel 2
C	Shaft			Not Req.	FS-3	Not Req.		
R4A	50Ω	2WW	77-001-113	WN-500	A43-50	WPK50	R50L	Hum, Channel 1
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.	
R5A	50Ω	2WW	77-001-113	WN-500	A43-50	WPK50	R50L	Hum, Channel 2
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.	

* Split element, open at center of range (2.5meg each side).
■ "STA-LOC" equivalent: FA16A, RU16A, CS3500.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R6	4.7meg	
R7	47K	
R8	22K	
R9	68K	
R10	1meg	
R11	3.3meg	
R12	220K	
R13	270K	
R14	3.3meg	
R15	220K	
R16	750K 5%	
R17	82K	
R18	82K	
R19	56K	
R20	56K	
R21	47K	
R22	10K	
R23	470K	
R24	330K	
R25	100Ω	Note 1
R26	1500Ω	
R27	240Ω 5%	

ITEM No.	RATING	REMARKS
R28	100K	
R29	75K 5%	
R30	100K	
R31	470K	
R32	470K	
R33	330Ω 7W	
R34	47K	
R35	4.7meg	
R36	47K	
R37	22K	
R38	68K	
R39	1meg	
R40	3.3meg	
R41	220K	
R42	270K	
R43	3.3meg	
R44	220K	
R45	750K 5%	
R46	82K	
R47	82K	
R48	56K	
R49	56K	

ITEM No.	RATING	REMARKS
R50	47K	
R51	10K	
R52	470K	
R53	330K	
R54	100Ω	Note 1
R55	1500Ω	
R56	240Ω 5%	
R57	100K	
R58	75K 5%	
R59	100K	
R60	470K	
R61	470K	
R62	330Ω 7W	
R63	47K	
R64	2200Ω 1W	
R65	2200Ω 1W	
R66	22K	Note 2
R67	22K	Note 2
R68	220K	
R69	220K	

Note 1. Not used in some versions.
Note 2. Run 6 uses 47K.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
				CHALLENGER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
	PRI.	SEC. 1	SEC. 2							
T1	117V @ .9A	660 VCT @ .130A	6.3V @ 3A	83-595-000						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @ .6A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	CHALLENGER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5600Ω CT	32Ω Tap @ 16Ω, 8Ω, 4Ω	83-288-000	24S61	A-2901①	AU-609	A-3870	24S61	S-55X	① Drill New Mounting Hole
T3	5600Ω CT	32Ω Tap @ 16Ω, 8Ω, 4Ω	83-288-000	24S61	A-2901①	AU-609	A-3870	24S61	S-55X	

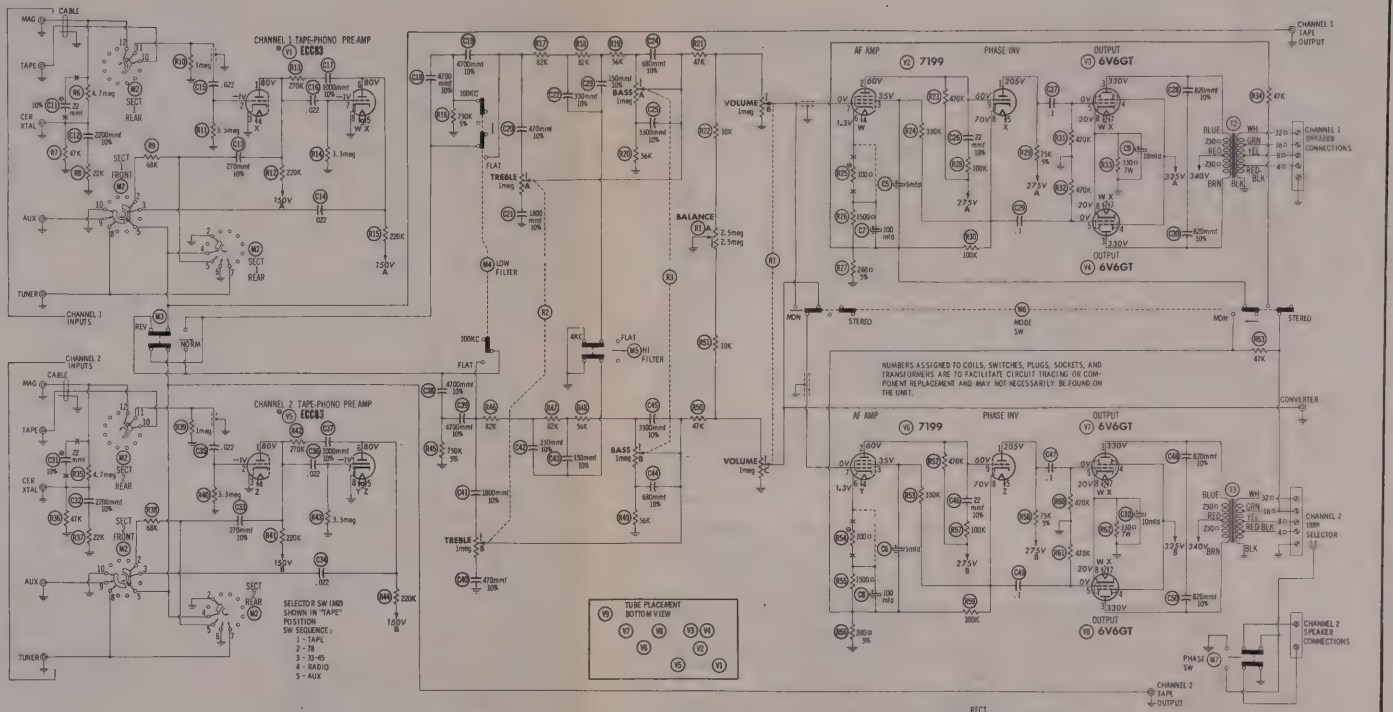
MISCELLANEOUS

ITEM No.	PART NAME	CHALLENGER PART No.	NOTES
M1	Switch	81-003-004	Off-On (SPDT, Slide Type)
M2	Switch	81-001-484	Function (Rotary Type)
M3	Switch	81-003-002	Reverse-Normal (DPDT, Slide-Type)
M4	Switch	81-003-009	Lo Filter (TPDT, Slide-Type)
M5	Switch	81-003-002	Hi Filter (DPDT, Slide-Type)
M6	Switch	81-003-009	Mode (Monaural-Stereo) (TPDT, Slide Type)
M7	Switch	81-003-002	Phase (DPDT, Slide Type)

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC83 12AX7	↑465K	3.3meg	0Ω	12Ω	12Ω	↑465K	3.3meg	0Ω	12Ω
V2	7199	↑100K	↑490K	430K	12Ω	12Ω	1700Ω	0Ω	100K	↑490K
V3	6V6GT	TP	12Ω	↑250Ω	↑2200Ω	470K	NC	12Ω	330Ω	
V4	6V6GT	TP	12Ω	↑250Ω	↑2200Ω	470K	TP	12Ω	330Ω	
V5	ECC83 12AX7	↑465K	3.3meg	0Ω	12Ω	12Ω	↑465K	3.3meg	0Ω	12Ω
V6	7199	↑100K	↑490K	430K	12Ω	12Ω	1700Ω	0Ω	100K	↑490K
V7	6V6GT	TP	12Ω	↑250Ω	↑2200Ω	470K	NC	12Ω	330Ω	
V8	6V6GT	TP	12Ω	↑250Ω	↑2200Ω	470K	TP	12Ω	330Ω	
V9	EZ81 6CA4	75Ω	NC	¶	12Ω	12Ω	NC	70Ω	NC	NC

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 3 OF V9.
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

⊛ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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CHALLENGER MODEL AC210A

PHOTOFACT* Folder

EIA

GROMMES
MODEL G-40

GROMMES
MODEL G-40

GROMMES
MODEL G-40

TRADE NAME	Grommes Model G-40		
MANUFACTURER	Precision Electronics Inc., 9101 King Ave., Franklin Park, Illinois		
TYPE SET	AC Operated 7 Tube Audio Amplifier		
POWER SUPPLY	110-120 Volts AC, 50-60 Cycles	RATING	115 Watts, 1.1 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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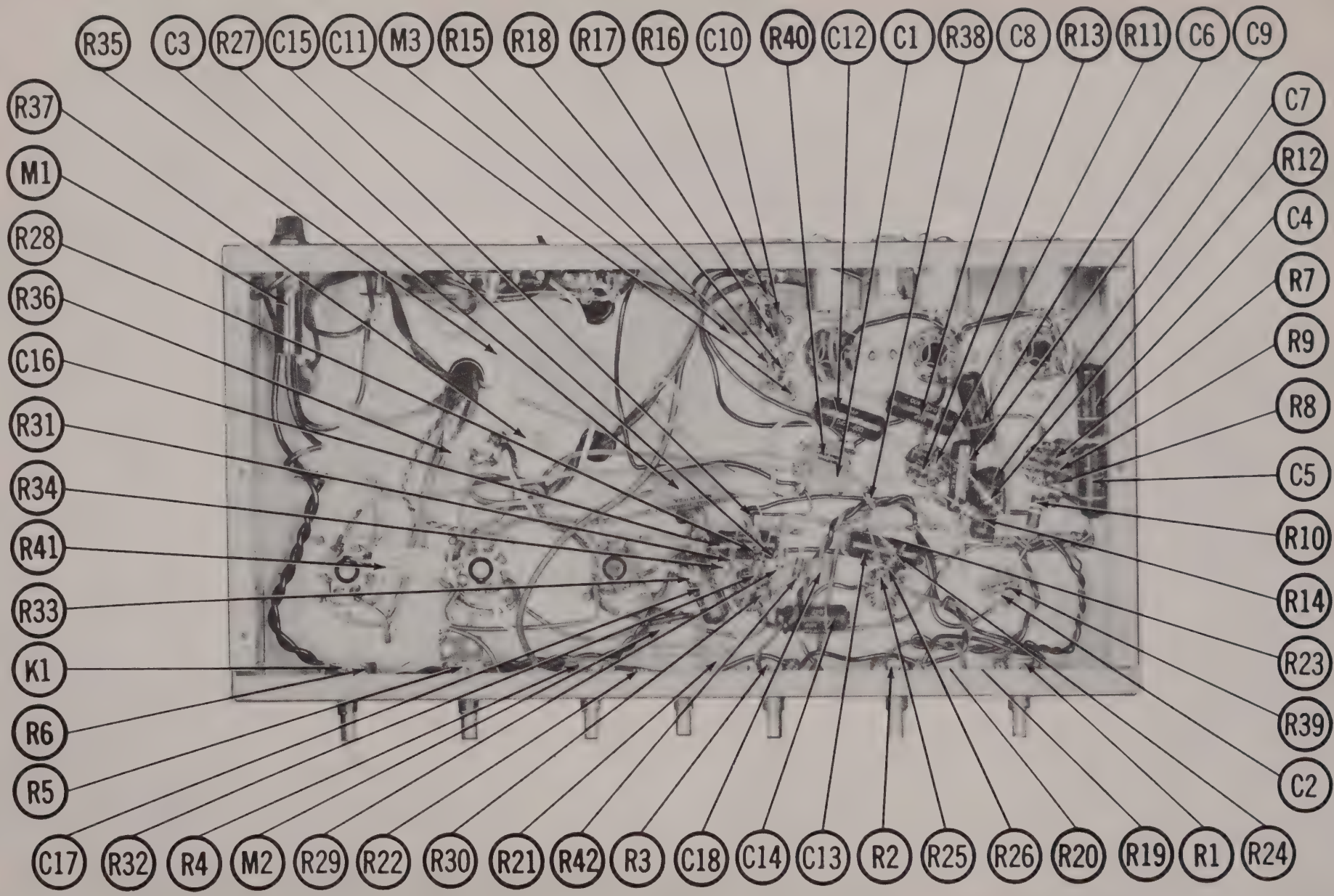
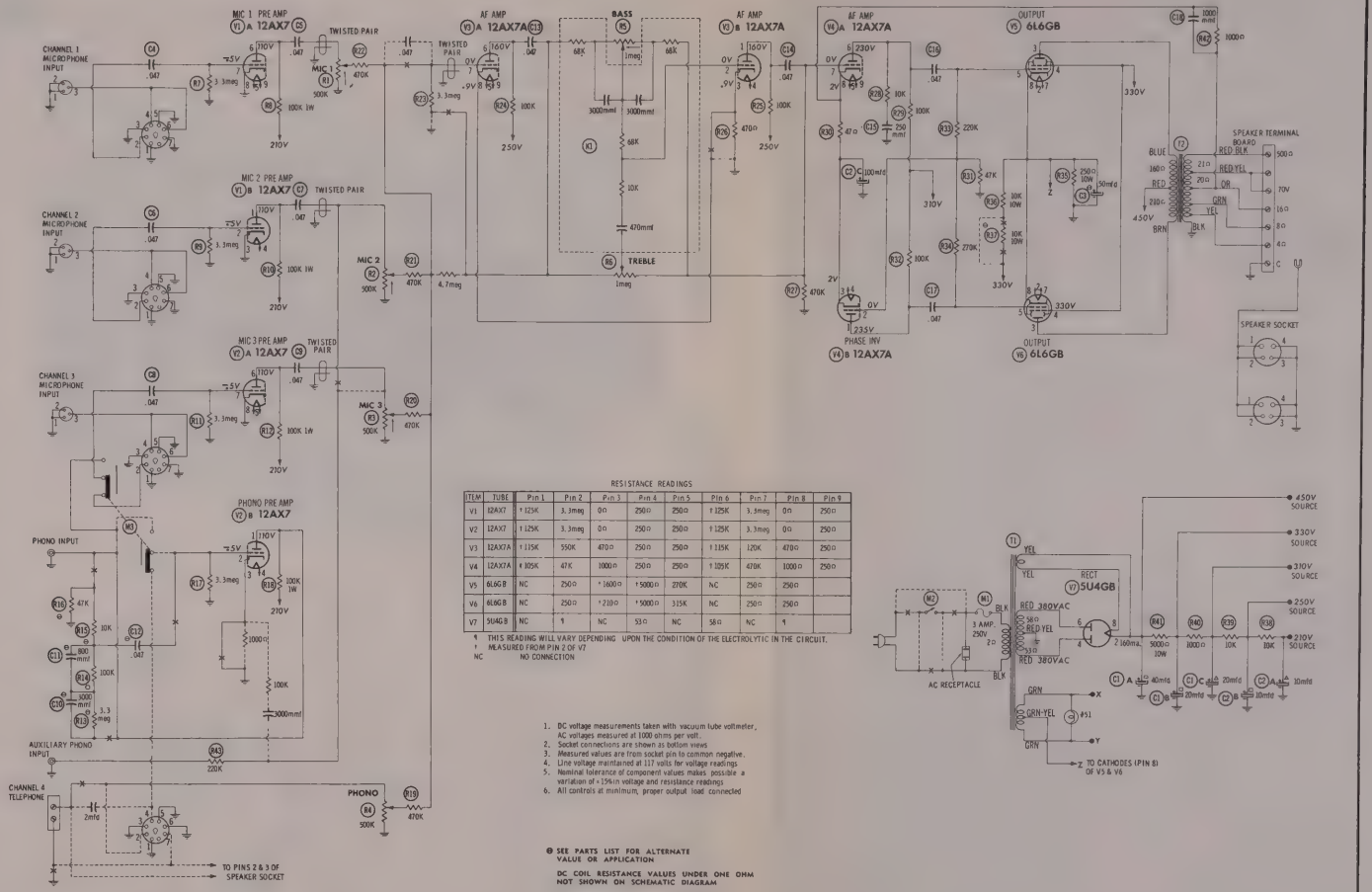


CHASSIS BOTTOM VIEW



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	¶ 125K	3.3meg	0Ω	250Ω	250Ω	¶ 125K	3.3meg	0Ω	250Ω
V2	12AX7	¶ 125K	3.3meg	0Ω	250Ω	250Ω	¶ 125K	3.3meg	0Ω	250Ω
V3	12AX7A	¶ 115K	550K	470Ω	250Ω	250Ω	¶ 115K	120K	470Ω	250Ω
V4	12AX7A	¶ 105K	47K	1000Ω	250Ω	250Ω	¶ 105K	470K	1000Ω	250Ω
V5	6L6GB	NC	250Ω	† 1600Ω	† 5000Ω	270K	NC	250Ω	250Ω	
V6	6L6GB	NC	250Ω	† 210Ω	† 5000Ω	315K	NC	250Ω	250Ω	
V7	5U4GB	NC	¶	NC	53Ω	NC	58Ω	NC	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 2 OF V7
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings
5. Nominal tolerance of component values makes possible a variation of ± 15% in voltage and resistance readings
6. All controls at minimum, proper output load connected

❶ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC
©Howard W. Sams & Co., Inc. 1959

GRONMES
MODEL G-40

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	CBS / GENERAL ELECTRIC / RAYTHEON / SYLVANIA TYPE
V1	Mic 1 Preamplifier-Mic 2 Preamplifier	12AX7
V2	Mic 3 Preamplifier-Phono Preamplifier	12AX7
V3	AF Amplifier	12AX7A
V4	AF Amp. -Phase Inv.	12AX7A
V5	Output	6L6GB
V6	Output	6L6GB
V7	Rectifier	5U4GB

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA GROMMES PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	450		AFH3-50-05	C0372	FP3961.1	TMQ-90	TVL-4731	
B	■20	450							
C	▲20	450							
C2A	▲10	300		AFH3-156	C1120	FP387.1 TC2501	TMT-155	TVL-3926	
B	■10	250							
C	100	15							
C3	50	25	①	PRS25V50	BBR50-25	TC29	TD-50-25	TVA-1206	

① Some versions may use 20mfd in this application.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C5	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C6	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C7	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C8	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C9	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C10	3000	①	BPD-003	DD-302	BYA10D3	CCD-302	B-233	5GA-D30
C11	800	①	BPD-0008	DD-801	L10T8	CCD-821	B-382	5GA-T80
C12	.047 400V	①	P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C13	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C14	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C15	250		DI-250	DD-251	L10T25	CCD-251	UC-5325	5GA-T25
C16	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C17	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C18	1000		BPD-001	DD-102	BYA10D1M	CCD-102	B-210	5HK-D10

① Not used in some versions.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA GROMMES PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	GVC-500K	B-60	A47-500K-Z	Q13-133	U48	Mic 1
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R2A	500K	½	GVC-500K	B-60	A47-500K-Z	Q13-133	U48	Mic 2
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R3A	500K	½	GVC-500K	B-60	A47-500K-Z	Q13-133	U48	Mic 3
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R4A	500K	½	GVC-500K	B-60	A47-500K-Z	Q13-133	U48	Phono
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R5A	1meg	½	GTC-1meg	B-69	A47-1meg-S	Q11-137	U54	Bass
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R6A	1meg	½	GTC-1meg	B-69	A47-1meg-S	Q11-137	U54	Treble
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R7	3.3meg	
R8	100K 1W	
R9	3.3meg	
R10	100K 1W	
R11	3.3meg	
R12	100K 1W	
R13	3.3meg	Note 1
R14	100K	Note 1
R15	10K	Note 1
R16	47K	Note 1
R17	3.3meg	
R18	100K 1W	

ITEM No.	RATING	REMARKS
R19	470K	
R20	470K	
R21	470K	
R22	470K	
R23	3.3meg	
R24	100K	
R25	100K	
R26	470Ω	
R27	470K	
R28	10K	
R29	100K	
R30	47Ω	

ITEM No.	RATING	REMARKS
R31	47K	
R32	100K	
R33	220K	
R34	270K	
R35	250Ω 10W	
R36	10K 10W	
R37	10K 10W	Note 1
R38	10K	
R39	10K	
R40	1000Ω	
R41	5000Ω 10W	
R42	1000Ω	
R43	220K	

Note 1. Not used in some versions.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	GROMMES PART No.	REPLACEMENT DATA
K1	Tone Comp.	470mmf, 3000mmf, 3000mmf, 10K, 68K, 68K, 68K	TC-190	

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	GROMMES PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ 1.1A	760 VCT @ .150A	5V @ 3A	TP4U-2						
	SEC. 3	SEC. 4	SEC. 5							
	6.3 VCT @ 3.1A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	GROMMES PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	6000Ω CT	500Ω Taps @ 167Ω, (70V), 16Ω, 8Ω, 4Ω	TO-40A							

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			GROMMES PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	3A 250V			312003 (3AG 3A 250V)	342001	AGC 3	HKP

MISCELLANEOUS

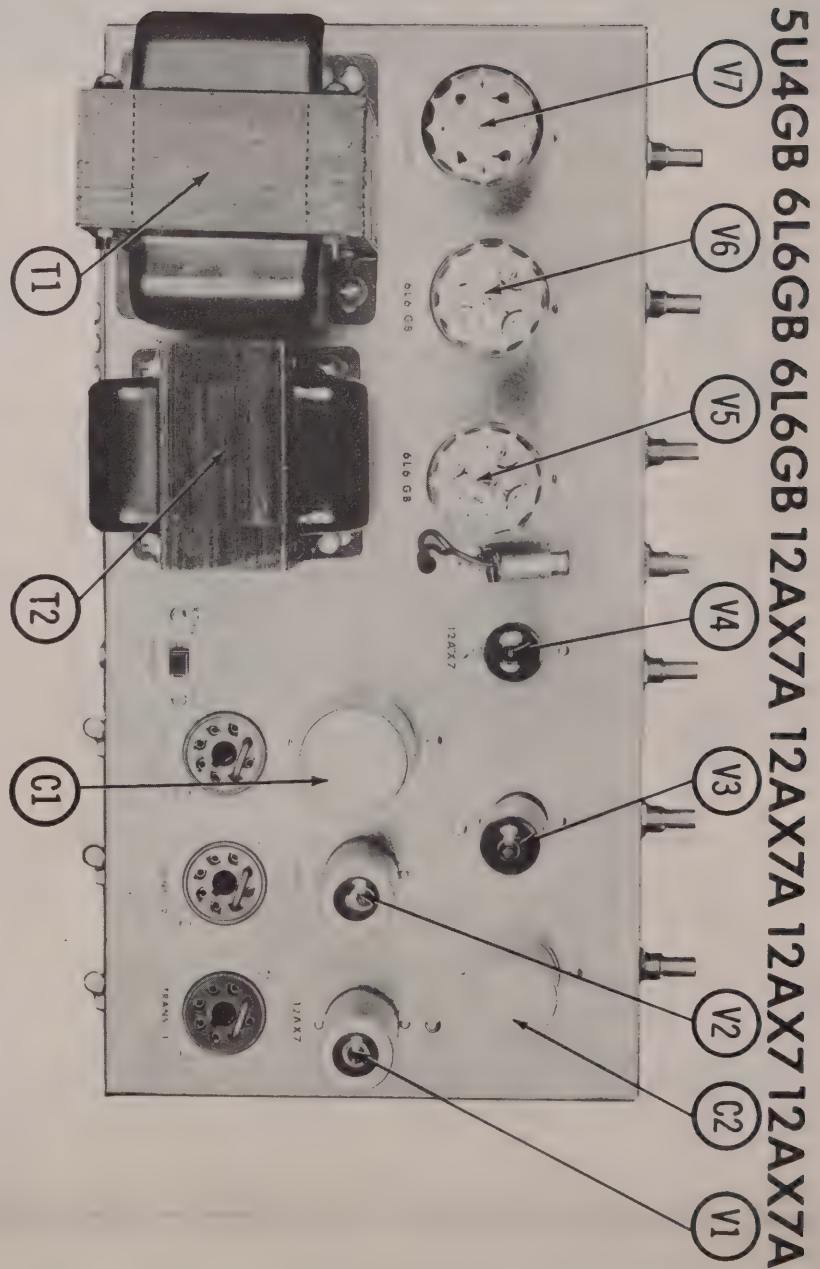
ITEM No.	PART NAME	GROMMES PART No.	NOTES
M2 M3	Switch Switch		Off-On Crystal-Magnetic (SPDT, Slide Type)

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

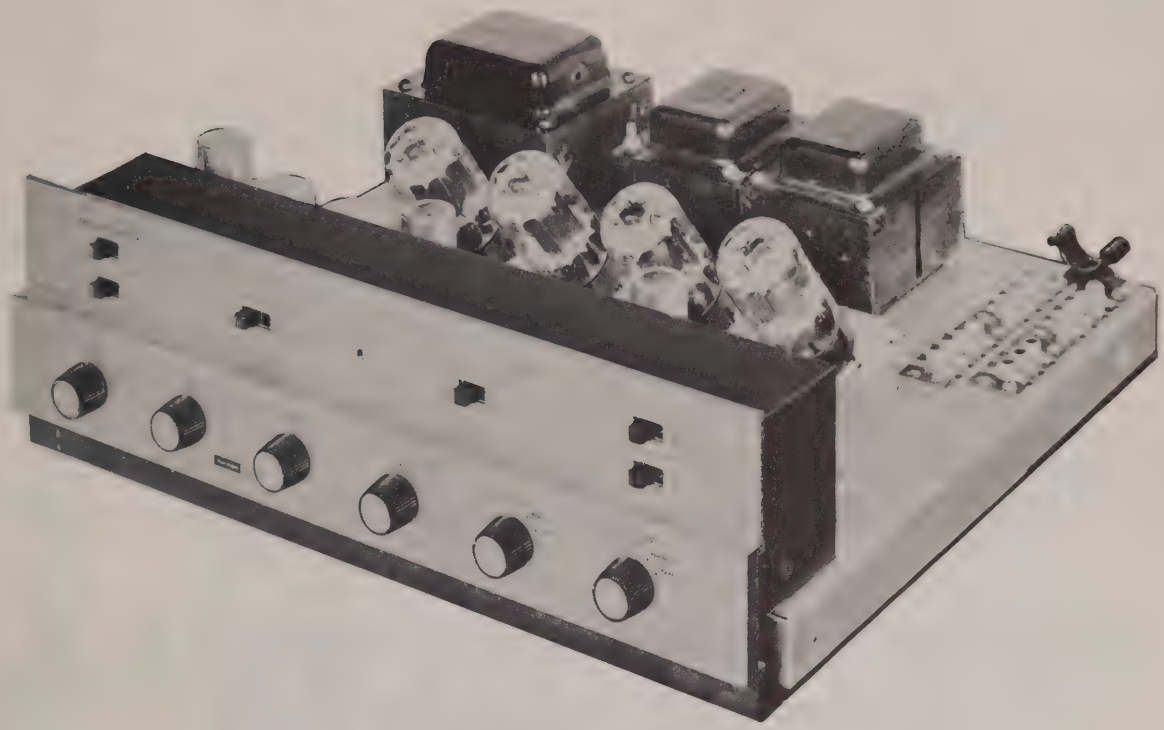
CHASSIS—TOP VIEW



PHOTOFACT* Folder

HARMAN-KARDON
MODEL A-250

HARMAN-KARDON
MODEL A-250



HARMAN-KARDON
MODEL A-250

TRADE NAME	Harman-Kardon Model A-250 (The Epic)
MANUFACTURER	Harman-Kardon, Inc., 520 Main Street, Westbury, L. I., N. Y.
TYPE SET	AC Operated 10 Tube Stereo Amplifier
POWER SUPPLY	105-125 Volts AC, 50-60 Cycles RATING 130 Watts, 1.4 Amp. @117 Volts AC

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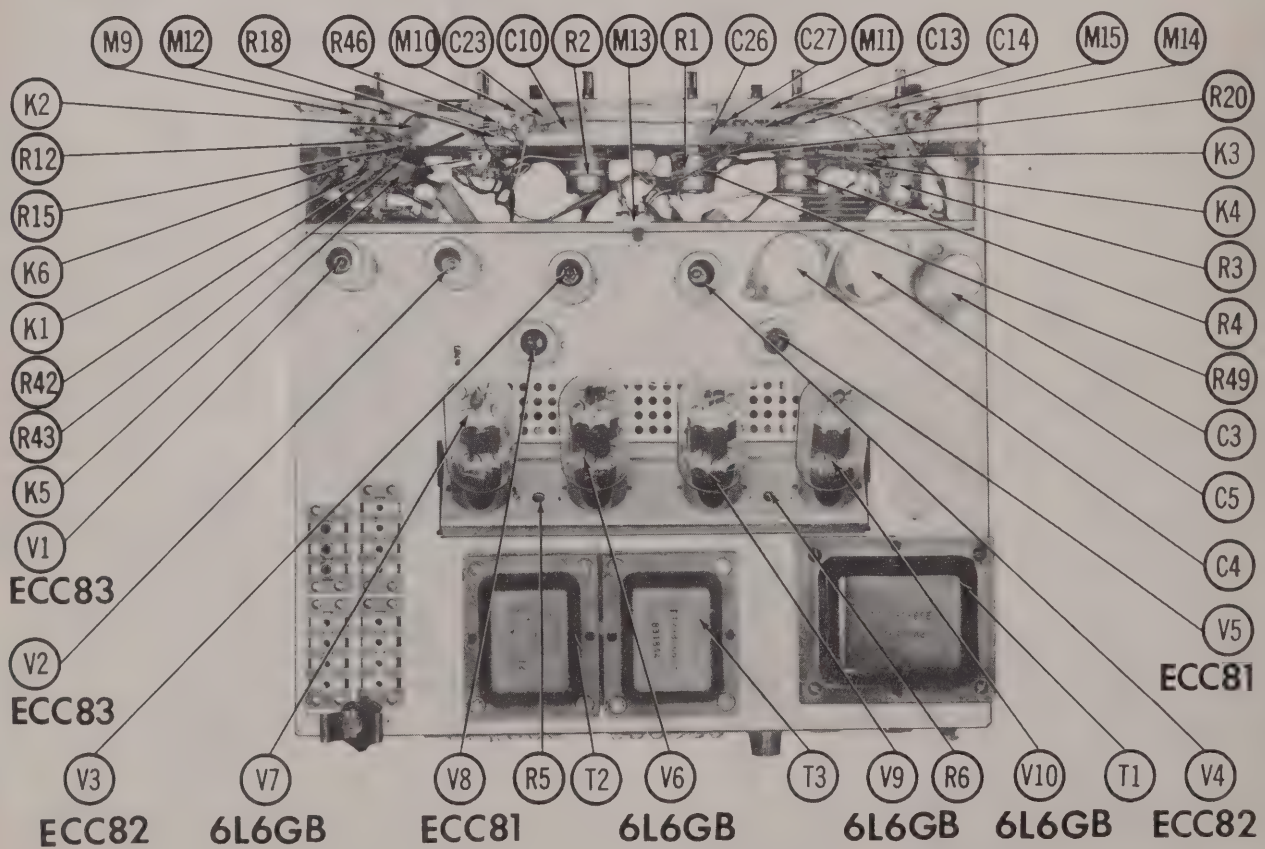
JV428

RESISTANCE READINGS

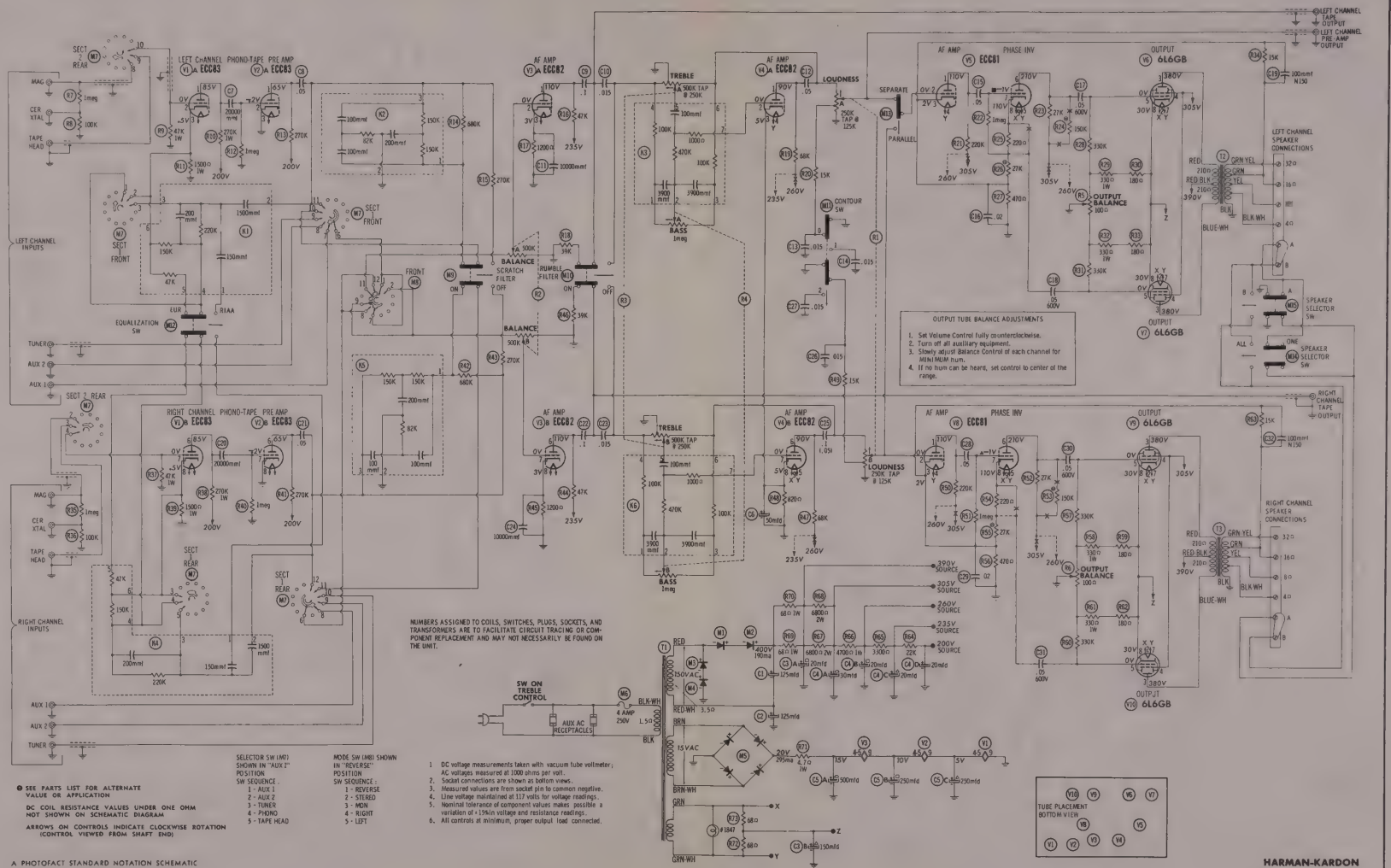
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC83 12AX7	†300K	47K	1500Ω	2Ω	2Ω	†300K	47K	1500Ω	0Ω
V2	ECC83 12AX7	†300K	1meg	0Ω	5Ω	5Ω	†300K	1meg	0Ω	2Ω
V3	ECC82 12AU7	†60K	250K	1200Ω	8Ω	8Ω	†60K	250K	1200Ω	5Ω
V4	ECC82 12AU7	†76K	700K	820Ω	200Ω	200Ω	†76K	700K	820Ω	200Ω
V5	ECC81 12AT7	†220K	0Ω	470Ω	200Ω	200Ω	†25K	1meg	27K	200Ω
V6	6L6GB	NC	200Ω	†270Ω	†3400Ω	330K	TP	200Ω	150Ω	
V7	6L6GB	NC	200Ω	†270Ω	†3400Ω	330K	TP	200Ω	150Ω	
V8	ECC81 12AT7	†220K	0Ω	470Ω	200Ω	200Ω	†25K	1meg	27K	200Ω
V9	6L6GB	NC	200Ω	†270Ω	†3400Ω	330K	TP	200Ω	150Ω	
V10	6L6GB	NC	200Ω	†270Ω	†3400Ω	330K	TP	200Ω	150Ω	

† MEASURED FROM OUTPUT OF M1.
■ MEASURED FROM PIN 8 OF V5.
▲ MEASURED FROM PIN 8 OF V8.

NC NO CONNECTION
TP TIE POINT



CHASSIS-TOP VIEW


LEFT CHANNEL PHONO-TAPE PRE AMP
RIGHT CHANNEL PHONO-TAPE PRE AMP
AF AMP
PHASE INV
OUTPUT
6L6GB
ECC83
ECC82
ECC81
TREBLE
BASS
BALANCE
LOUDNESS
CONTOUR
OUTPUT BALANCE
SPEAKER SELECTOR SW
LEFT CHANNEL SPEAKER CONNECTIONS
RIGHT CHANNEL SPEAKER CONNECTIONS
LEFT CHANNEL INPUTS
RIGHT CHANNEL INPUTS
TUNER
AUX 2
AUX 1
MAG
CER XTAL
TAPE HEAD
EQUALIZATION SW
SCRATCH FILTER
RUMBLE FILTER
SW ON TREBLE CONTROL
AUX AC RECEPTACLES
OUTPUT TUBE BALANCE ADJUSTMENTS
1. Set Volume Control fully counterclockwise.
2. Turn off all auxiliary equipment.
3. Slowly adjust Balance Control of each channel for MINIMUM hum.
4. If no hum can be heard, set control to center of the range.
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.
SELECTOR SW (M7) SHOWN IN "AUX 2" POSITION
SW SEQUENCE :
1 - AUX 1
2 - AUX 2
3 - TUNER
4 - PHONO
5 - TAPE HEAD
MODE SW (M8) SHOWN IN "REVERSE" POSITION
SW SEQUENCE :
1 - REVERSE
2 - STEREO
3 - MON
4 - RIGHT
5 - LEFT
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
TUBE PLACEMENT BOTTOM VIEW
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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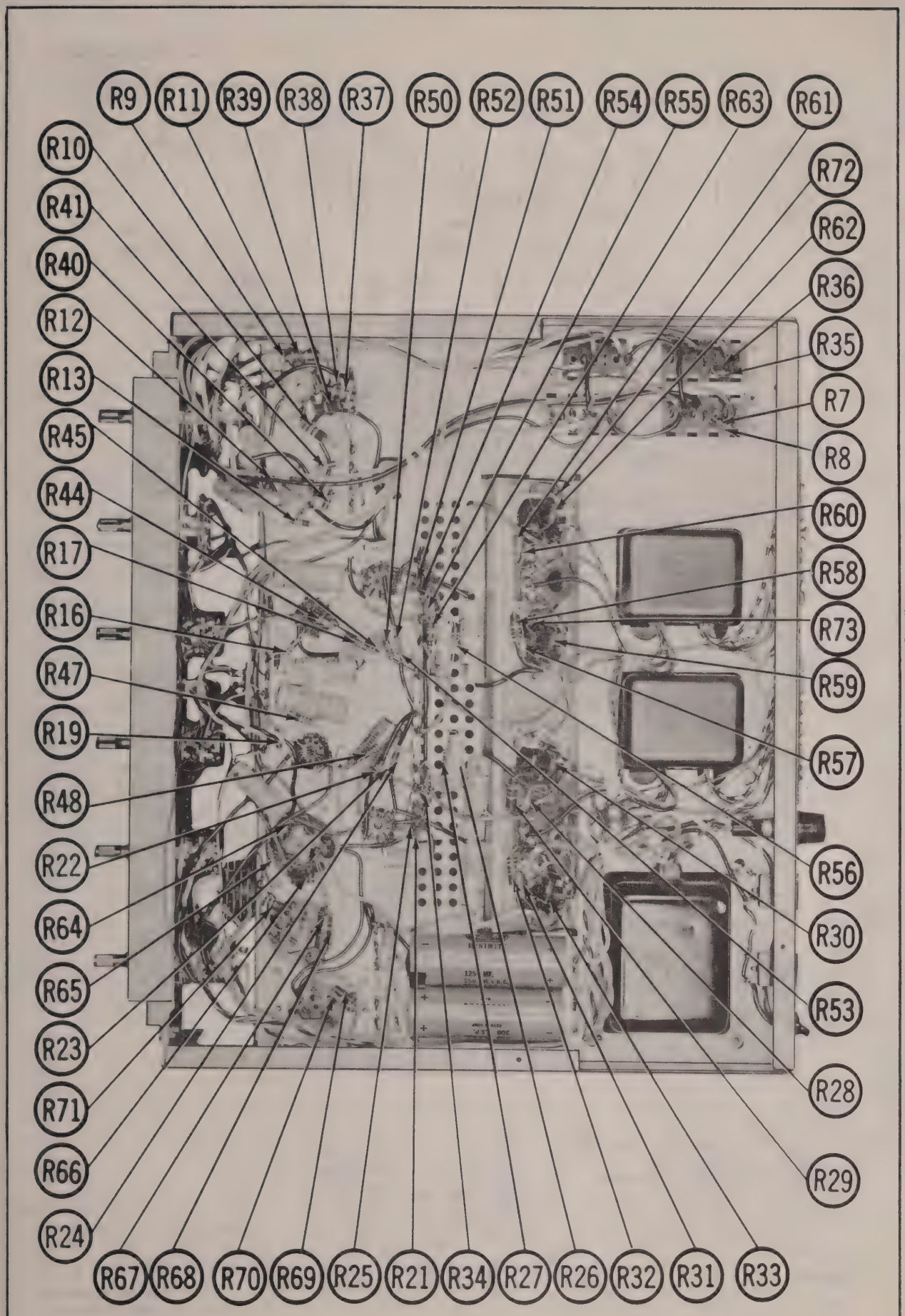
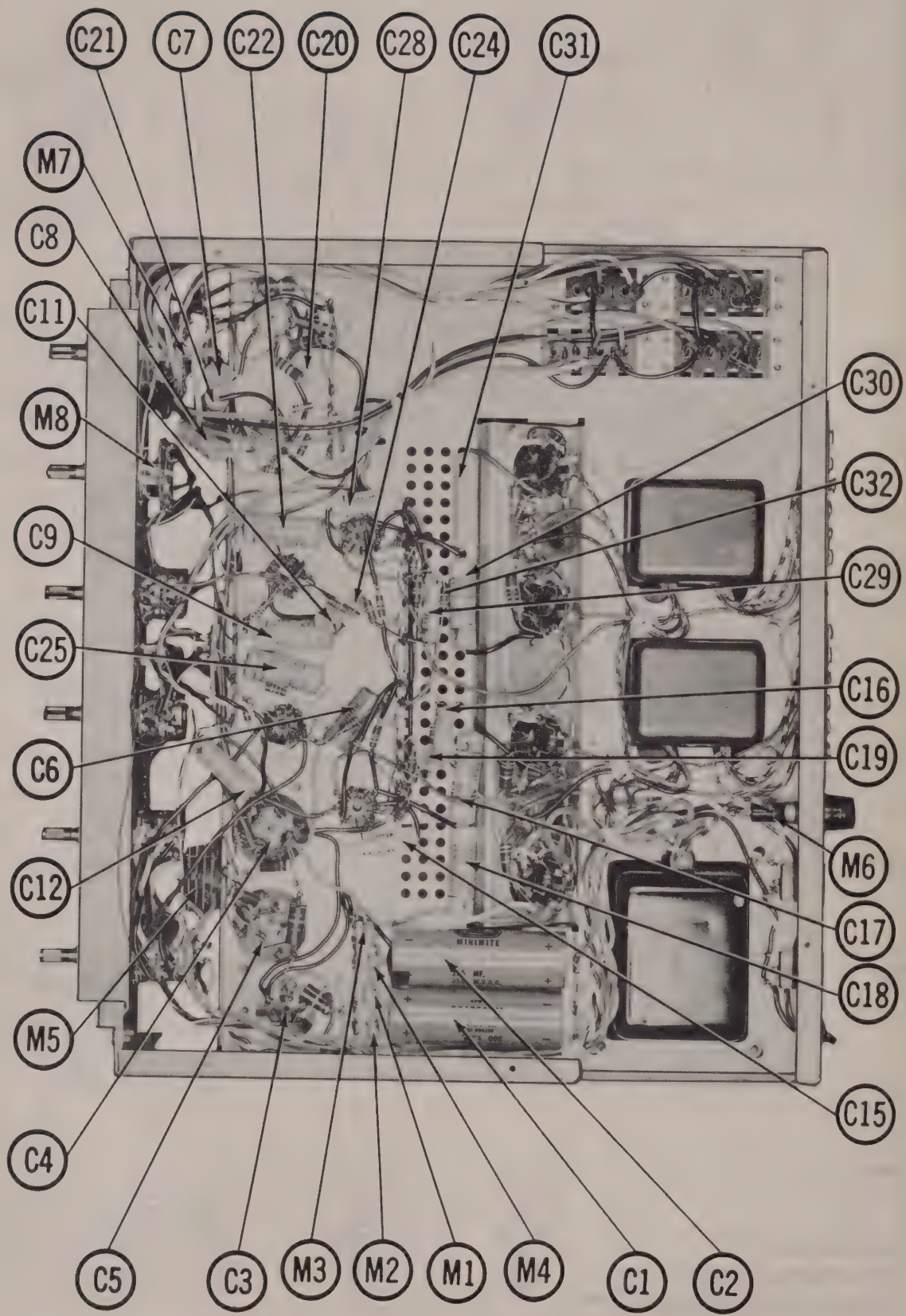
HARMAN-KARDON
MODEL A-250



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



CHASSIS BOTTOM VIEW - CAPACITOR & MISC. IDENT.

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE
V1	Left Channel Phono-Tape Preamp. -Right Channel Phono-Tape Preamp.	ECC83/12AX7
V2	Left Channel Phono-Tape Preamp. -Right Channel Phono-Tape Preamp.	ECC83/12AX7
V3	Left Channel AF Amp. - Right Channel AF Amp.	ECC82/12AU7
V4	Left Channel AF Amp. - Right Channel AF Amp.	ECC82/12AU7
V5	Left Channel AF Amp. - Left Channel Phase Inv.	ECC81/12AT7
V6	Left Channel Output	6L6GB
V7	Left Channel Output	6L6GB
V8	Right Channel AF Amp. - Right Channel Phase Inv.	ECC81/12AT7
V9	Right Channel Output	6L6GB
V10	Right Channel Output	6L6GB

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA Harman-Kardon PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	125	250	JE2382720	PRS1595	BBRT7V4125			TVAS-1524 *	
C2	125	250	JE2382720	PRS1595	BBRT7V4125			TVAS-1524 *	
C3A	■20	450	JE2382669	AFH3-166-15	C1300	FP387.1	TMS-55	TVL-1714	
B	▲150	50					TD-150-50	TVA-1311	
C4A	▲30	400	JE2382668	AFH4-06	D0050	FP444.8	TMQ-7	TVL-4769.4	
B	■20	400							
C	▲20	300							
D	20	300							
C5A	▲500	25	JE2382667					TVLS-3205 *	
B	■250	15							
C	▲250	15							
C6	50	12	JE2382923	SRE12V50	BBR50-25	TC29	TD-50-25	TVA-1206	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C7	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C8	.05 400V		P488N-05	DF-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C9	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C10	.015 100V		P288N-015	DD16-153	CUB6S15	1DP-1-153	GEM-4115	4TM-S15
C11	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C12	.05 400V		P488N-05	DF-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C13	.015 100V		P288N-015	DD16-153	CUB6S15	1DP-1-153	GEM-4115	4TM-S15
C14	.015 100V		P288N-015	DD16-153	CUB6S15	1DP-1-153	GEM-4115	4TM-S15
C15	.05 200V		P288N-05	DF-503	CUB2S5	4DP-3-503	GEM-415	2TM-S5
C16	.02 200V		P288N-02	DD-203	CUB2S2	4DP-2-203	GEM-412	2TM-S2
C17	.05 600V		P688N-05	DF-503	CUB6S5	6DP-3-503	GEM-615	6TM-S5
C18	.05 600V		P688N-05	DF-503	CUB6S5	6DP-3-503	GEM-615	6TM-S5
C19	100 N150					*		10TCP-T15
C20	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C21	.05 400V		P488N-05	DF-503	CUB6S5	4DP-3-503	GEM-415	4TM-S5
C22	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C23	.015 100V		P288N-015	DD16-153	CUB6S15	1DP-1-153	GEM-4115	4TM-S15
C24	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C25	.1 400V	(.05) †	P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C26	.015 100V		P288N-015	DD16-153	CUB6S15	1DP-1-153	GEM-4115	4TM-S15
C27	.015 100V		P288N-015	DD16-153	CUB6S15	1DP-1-153	GEM-4115	4TM-S15
C28	.05 200V		P288N-05	DF-503	CUB2S5	4DP-3-503	GEM-415	2TM-S5
C29	.02 200V		P288N-02	DD-203	CUB2S2	4DP-2-203	GEM-412	2TM-S2
C30	.05 600V		P688N-05	DF-503	CUB6S5	6DP-3-503	GEM-615	6TM-S5
C31	.05 600V		P688N-05	DF-503	CUB6S5	6DP-3-503	GEM-615	6TM-S5
C32	100 N150					*		10TCP-T15

† Alternate

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Harman-Kardon PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	250K *	1/2	RV2382670					Loudness, Left Channel
B	250K *	1/2						Loudness, Right Channel
R2A	500K	1/2	RV2382672	B-59	AD47-500K-S	Q11-133		Balance, Left Channel
B	500K	1/2		SR-59	Not Req.	M11-133	■ UE129S	Balance, Right Channel
C	Shaft			Not Req.	KSS-3	Not Req.		
R3A	500K †	1/2	RV2382671	BT-64				Treble, Left Channel
B	500K †	1/2		STR-64				Treble, Right Channel
C	Switch			KR-1				Power Off-On
R4A	1meg	1/2	RV2382673	B-69	AD47-1meg-S	Q11-137		Bass, Left Channel
B	1meg	1/2		SR-69	Not Req.	M11-137	▲	Bass, Right Channel
C	Shaft			Not Req.	KSS-3	Not Req.		
R5	100Ω	1/2	RVCOM2569	B-1			U-1	Output Balance, Right Chan.
R6	100Ω	1/2	RVCOM2569	B-1			U-1	Output Balance, Left Chan.

* Tap at 125K.
† Tap at 250K.
■ "STA-LOC" equivalent: FA55L, RU55L, CS3500.
▲ "STA-LOC" equivalent: FA16L, RU16L, CS3500.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R7	1meg	
R8	100K	
R9	47K 1W	
R10	270K 1W	
R11	1500Ω 1W	
R12	1meg	
R13	270K	
R14	680K	
R15	270K	
R16	47K	
R17	1200Ω	
R18	39K	
R19	68K	
R20	15K	
R21	220K	
R22	1meg	
R23	27K	
R24	150K	Note 1
R25	220Ω	
R26	27K	Note 2
R27	470Ω	
R28	330K	
R29	330Ω 1W	
R30	180Ω	
R31	330K	
R32	330Ω 1W	
R33	180Ω	
R34	15K	
R35	1meg	
R36	100K	
R37	47K 1W	
R38	270K 1W	
R39	1500Ω 1W	
R40	1meg	
R41	270K	
R42	680K	
R43	270K	
R44	47K	
R45	1200Ω	
R46	39K	
R47	68K	
R48	820Ω	
R49	15K	
R50	220K	
R51	1meg	
R52	27K	
R53	150K	Note 1
R54	220Ω	
R55	27K	Note 2
R56	470Ω	
R57	330K	
R58	330Ω 1W	
R59	180Ω	
R60	330K	
R61	330Ω 1W	
R62	180Ω	
R63	15K	
R64	22K	
R65	3300Ω	
R66	4700Ω 1W	
R67	6800Ω 2W	
R68	6800Ω 2W	
R69	68Ω 1W	
R70	68Ω 1W	
R71	4.7Ω 1W	
R72	68Ω	
R73	68Ω	

Note 1. Not used in some versions.
Note 2. R26, & R55 matched within 2%.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Harman-Kardon PART No.	REPLACEMENT DATA	
K1	Left Channel Equalization Comp.	150mmf, 200mmf, 1500mmf, 47K, 150K, 220K	PC2382926	Sprague	TC-21
K2	Left Channel Scratch Filter Comp.	100mmf, 100mmf, 200mmf, 82K, 150K, 150K	PCCOM2927	Sprague	TC-19
K3	Left Channel Tone Comp.	100mmf, 3900mmf, 3900mmf, 1000Ω, 100K, 100K, 470K	PC2382890	Sprague	TC-20
K4	Right Channel Equalization Comp.	150mmf, 200mmf, 1500mmf, 47K, 150K, 220K	PC2382926	Sprague	TC-21
K5	Right Channel Scratch Filter Comp.	100mmf, 100mmf, 200mmf, 82K, 150K, 150K	PCCOM2927	Sprague	TC-19
K6	Right Channel Tone Comp.	100mmf, 3900mmf, 3900mmf, 1000Ω, 100K, 100K, 470K	PC2382890	Sprague	TC-20

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	Harman-Kardon PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ⓐ 1.4A	150V ⓐ .8A (AC)	15V ⓐ .3A	FT2382665						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V ⓐ 4.5A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Harman-Kardon PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7000Ω CT	32Ω Tap ⓐ 16Ω, 8Ω, 4Ω	FT2382666							
T3	7000Ω CT	32Ω Tap ⓐ 16Ω, 8Ω, 4Ω	FT2382666							

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					
	CURRENT (Measured)	Harman-Kardon PART No.	INTERNATIONAL PART No.	ITT PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.190A	Z2382924 ①	5E4 ①	HA154 ①	40K ①	SR500 ①	① Silicon Type
M2	.190A	Z2382924 ①	5E4 ①	HA154 ①	40K ①	SR500 ①	② Selenium Type
M3	.190A	Z2382924 ①	5E4 ①	HA154 ①	40K ①	SR500 ①	
M4	.190A	Z2382924 ①	5E4 ①	HA154 ①	40K ①	SR500 ①	
M5	.295A	Z2382779 ②	B1B ②	1016 ②	304B ①		

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Harman-Kardon PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M6	3AG	4A 250V			312004 (3AG 4A 250V)	342001	MTH 4	HKP

MISCELLANEOUS

ITEM No.	PART NAME	Harman-Kardon PART No.	NOTES
M7	Switch	ER2382722	Function
M8	Switch	ER2383123	Mode
M9	Switch	ESCOM2727	Scratch Filter (DPDT, Slide Type)
M10	Switch	ESCOM2727	Rumble Filter (DPDT, Slide Type)
M11	Switch	ES1021717	Contour (DPDT, Slide Type)
M12	Switch	ESCOM2727	Equalization (DPDT, Slide Type)
M13	Switch	ES771372	Separate-Parallel (SPDT, Slide Type)
M14	Switch	ESCOM2727	Speaker, All-One (DPDT, Slide Type)
M15	Switch	ESCOM2727	Speaker, A-B (DPDT, Slide Type)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	PCCM2840	

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

HARMONY MODEL SA-7

HARMONY
MODEL SA-7

HARMONY
MODEL SA-7

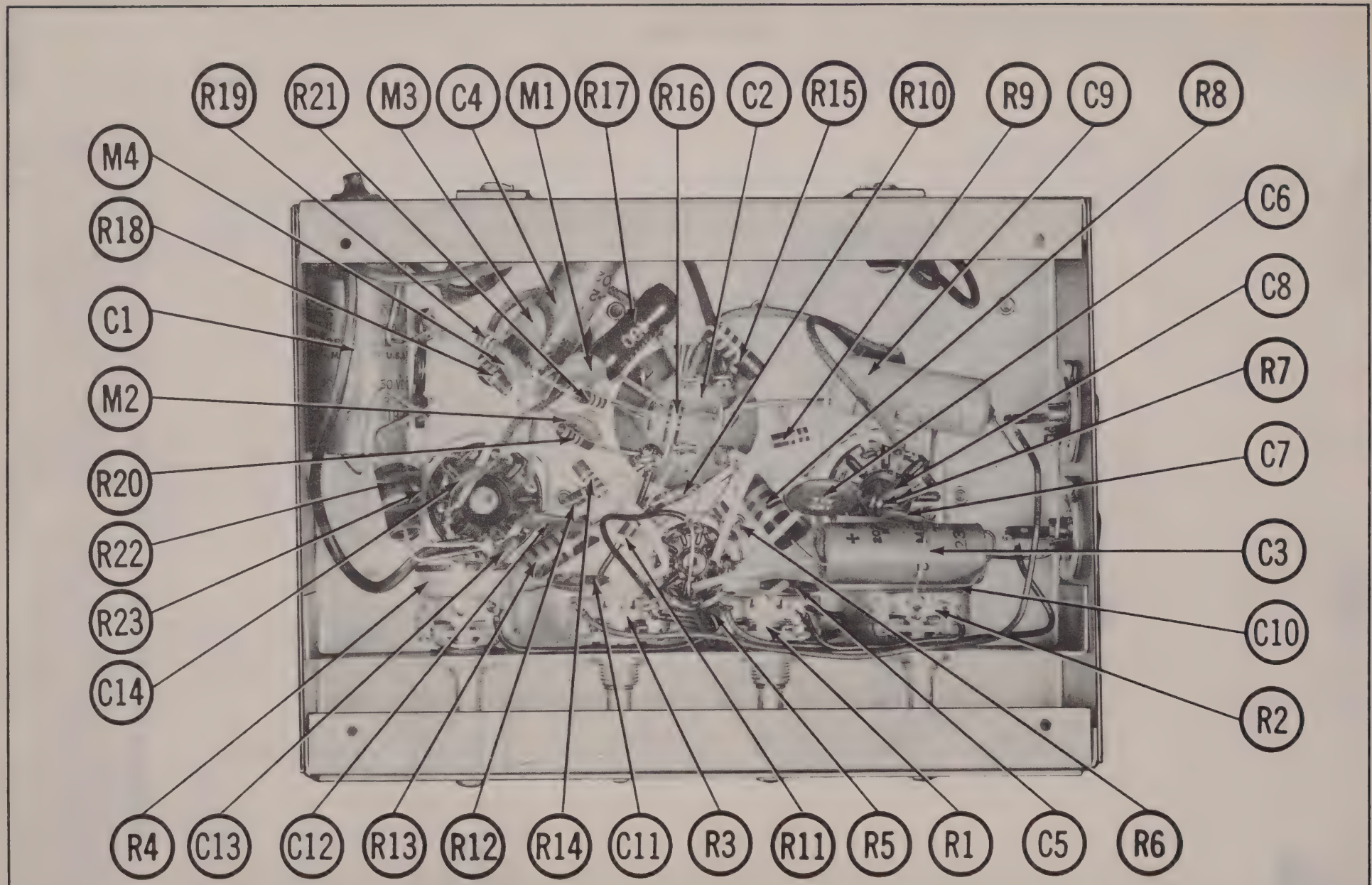
TRADE NAME	Harmony Model SA-7
MANUFACTURER	Continental Manufacturing Inc., 1612 California Street, Omaha, Nebraska
TYPE SET	AC-DC Operated 3 Tube Stereo Amplifier
POWER SUPPLY	110-120 Volts AC-DC RATING 52 Watts, .57 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

JV407

SET 467 FOLDER 8



CHASSIS BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Channel 1 AF Amp. - Channel 2 AF Amp.	12AX7	V2 V3	Channel 1 Output Channel 2 Output	50L6GT 50L6GT

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	HARMONY PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	40	150		PRS1470	BR4015	TC48	TD-40-150	TVA-1413	
C2A	▲40	350		AFH4-06-40	D0054	FP421.9	TMQ-119	TVL-4674	
B	■40	350							
C	▲30	350							
D	20	350							
C3	50	25		PRS1265	BBR50-25	TC29	TD-50-25	TVA-1206	
C4	50	25		PRS1265	BBR50-25	TC29	TD-50-25	TVA-1206	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C6	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C7	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C8	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C9	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C10	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C11	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C12	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C13	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C14	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	HARMONY PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	3meg	½	1206	B-85	A47-3meg-Z	Q13-140	U57	Volume, Channel 1
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R2A	500K	½		B-60	A47-500K-Z	Q13-133	U48	
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	Tone, Channel 1
R3A	3meg	½	1206	B-85	A47-3meg-Z	Q13-140	U57	Volume, Channel 2
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R4A	500K	½		B-60-S	A47-500K-Z	Q13-133	U48	Tone, Channel 2
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			Not Req.	SWE-12	76-1	US-26	Power Off-On

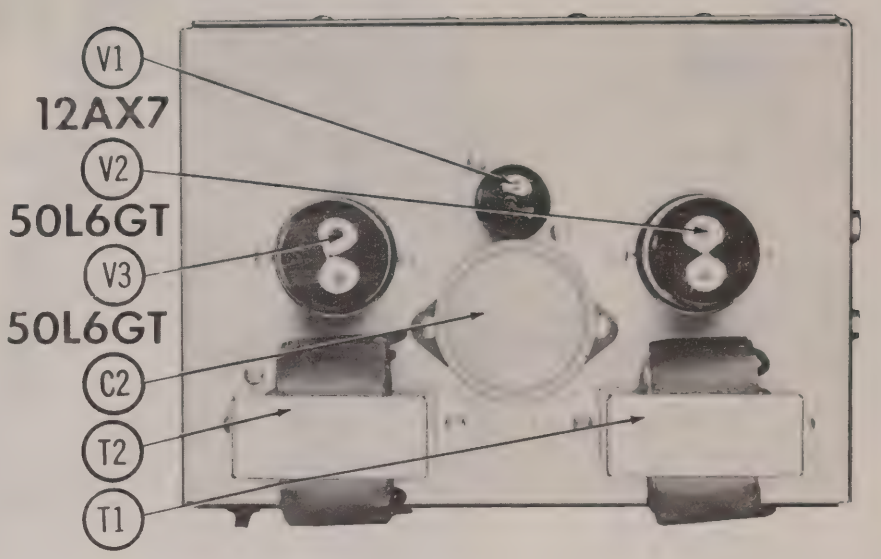
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS	ITEM No.	RATING	REMARKS	ITEM No.	RATING	REMARKS
R5	10meg		R12	470K		R19	470K	
R6	270K		R13	180Ω 2W	(150Ω 2W) *	R20	470K	
R7	470K		R14	470K		R21	470K	
R8	180Ω 2W	(150Ω 2W) *	R15	33K 1W		R22	10Ω 2W	
R9	470K		R16	22K		R23	47Ω 2W	
R10	10meg		R17	400Ω 5W				
R11	270K		R18	470K				

* Alternate

CHASSIS—TOP VIEW



TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	HARMONY PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2400Ω CT	3-4Ω	14-W-2	24S64	A-2902	AU-604	A-3849	24S64	S-1X	
T2	2400Ω CT	3-4Ω	14-W-2	24S64	A-2902	AU-604	A-3849	24S64	S-1X	

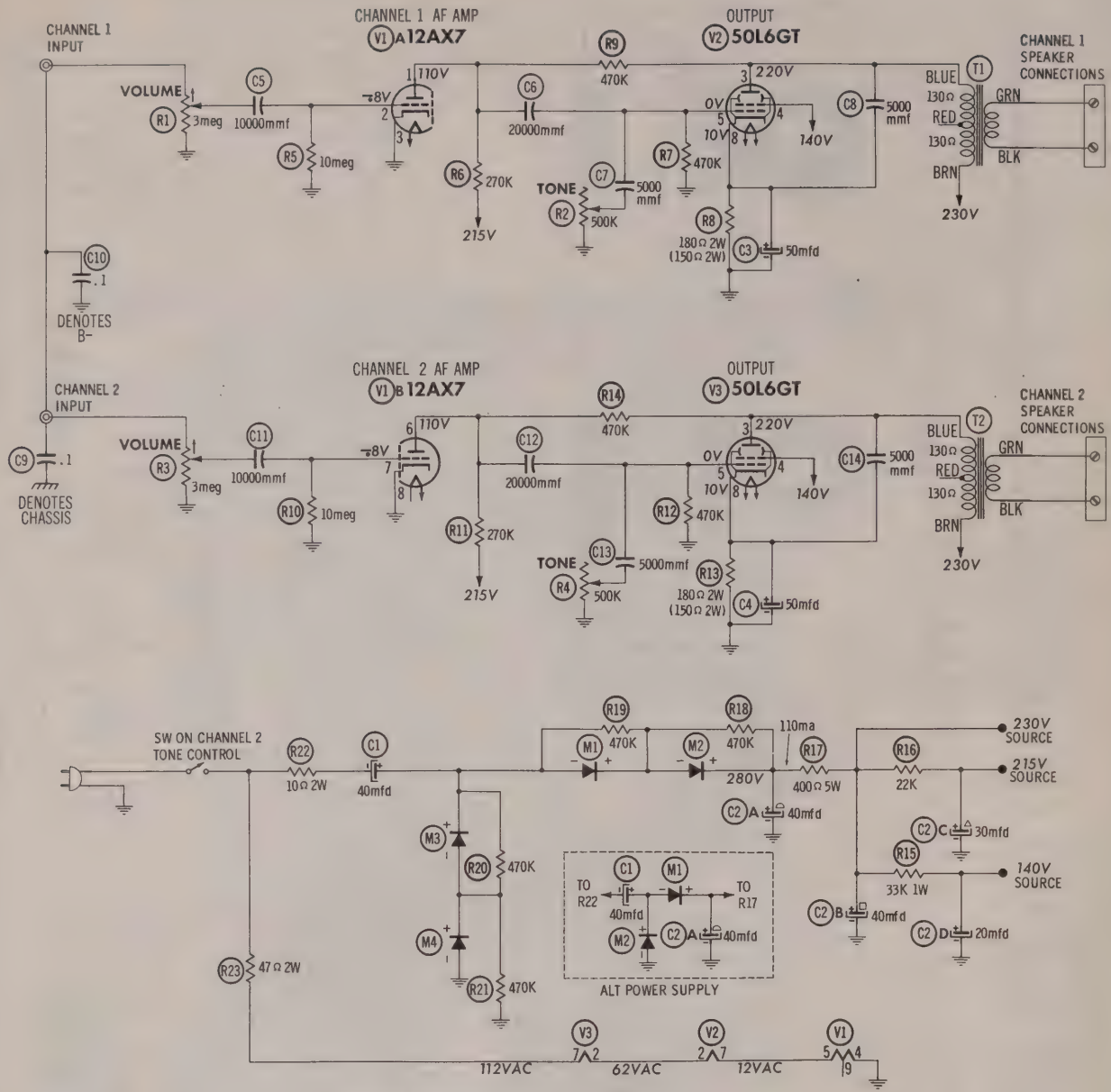
RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	HARMONY PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.110A	①	HA154①	5E4①	K200①	SR200①	① Silicon Type
M2	.110A	①	HA154①	5E4①	K200①	SR200①	
M3	.110A	①	HA154①	5E4①	K200①	SR200①	
M4	.110A	①	HA154①	5E4①	K200①	SR200①	

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†290K	10meg	0Ω	0Ω	12Ω	290K	10meg	0Ω	6Ω
V2	50L6GT	NC	62Ω	†660Ω	†33K	470K	NC	12Ω	180Ω	
V3	50L6GT	NC	62Ω	†660Ω	†33K	470K	NC	115Ω	180Ω	

† MEASURED FROM OUTPUT OF M2
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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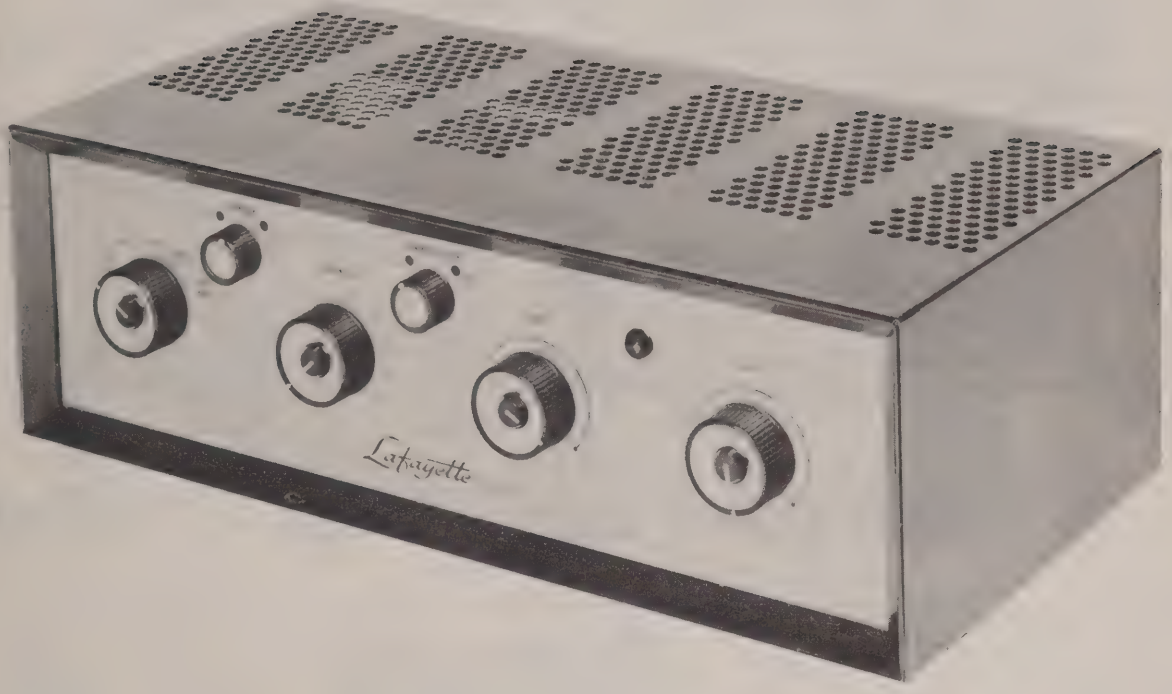
HARMONY MODEL SA-7

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

LAFAYETTE
MODEL LA45

LAFAYETTE
MODEL LA45



LAFAYETTE
MODEL LA45

TRADE NAME	Lafayette Model LA-45		
SUPPLIER	Lafayette Radio, 165-08 Liberty Ave., Jamaica 33, N. Y.		
TYPE SET	AC Operated 5 Tube Audio Amplifier		
POWER SUPPLY	105-125 Volts AC, 60 Cycles	RATING	56 Watts, .58 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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JX400

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆		GENERAL ELECTRIC ◆		RAYTHEON ◆		SYLVANIA ◆	
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Mag. - Tape Preamplifier	ECC83/12AX7	V4	Output	EL84/6BQ5
V2	AF Amp. - Phase Inverter	ECC83/12AX7	V5	Rectifier	EZ81/6CA4
V3	Output	EL84/6BQ5			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	LAFAYETTE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	●20	350	E-212-3	AFH4-80	D0530	FP437	TMQ-95	TVL-4740	
B	■20	350							
C	▲20	350							
D	100	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

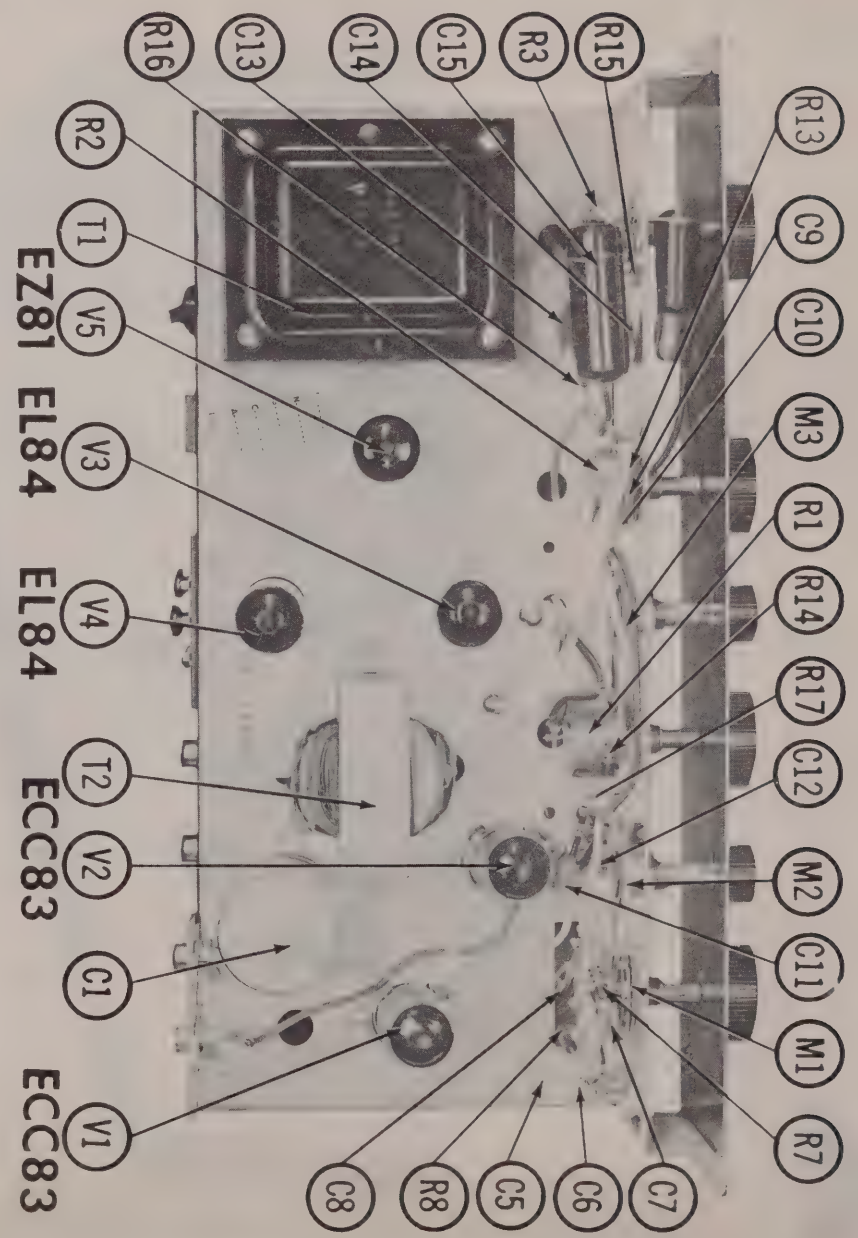
ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	.25 400V		P488N-25		CUB4P5	4DP-5-254	GEM-4025	4TM-P25
C3	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C4	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C5	1000		BPD-001	DD-102	BYA10D1M	CCD-102	B-210	5HK-D10
C6	680 10%		DI-680	DD-681	1R5T68	CCS-681	JL-368	10TS-T68
C7	120 N750			TCN-120	C10T12U	CCTN-121	CN7-312	10TCU-T12
C8	330		BPD-00033	DD-331	L10T33	CCD-331	B-333	5GA-T33
C9	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C10	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C11	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C12	1000		BPD-001	DD-102	BYA10D1M	CCD-102	B-210	5HK-D10
C13	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C14	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C15	.5 200V		P288N-5		CUB2P5	2DP-5-504	GEM-205	2TM-P5
C16	100 N750		N750-DI 100	DTN-100	C10T1U	CCTN-101	CN7-310	10TCU-T10
C17	.05 600V		P688N-05	DF-503	CUB6S5	6DP-3-503	GEM-615	6TM-S5
C18	.05 600V		P688N-05	DF-503	CUB6S5	6DP-3-503	GEM-615	6TM-S5

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES	
	RESISTANCE	WATTS	LAFAYETTE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.		
R1A	1meg	½	V-315B-5	BT-2	A47F1-1meg	Q13-137X	UT-440	Loudness	Note 1
	200K tap								
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.		
C	Switch			KR-1	SWE-12	76-1	US-26		
R2A	25K	½	V-315B-7	B-27	A47-25K-V		U28	Treble	Note 2
B	Shaft			Not Req.	KSS-3		Not Req.		
R3A	250K	½	V-315B-6	B-51	A47D-250K-2	Q13-130	U44	Bass	Note 3
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.		

Note 1. Some versions may use Part #V-315B-1.
Note 2. Some versions may use Part #V-315B-3.
Note 3. Some versions may use Part #V-315B-2.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	100K	
R5	470K	
R6	820Ω	
R7	68K	
R8	220K	
R9	1meg	
R10	470K	
R11	270K	
R12	1500Ω	

ITEM No.	RATING	REMARKS
R13	1meg	
R14	68K	
R15	6800Ω	
R16	3300Ω	
R17	47K	
R18	270K	
R19	390Ω	
R20	56K 1W	
R21	180K	

ITEM No.	RATING	REMARKS
R22	270K	
R23	1500Ω	
R24	390K	
R25	390K	
R26	150Ω 3W	
R27	3300Ω	
R28	27K 1W	
R29	3300Ω 1W	
R30	4.7Ω	
R31	470Ω	

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	LAFAYETTE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .58A	560VCT @ .070A	6.3VCT @ 3.2A	T-153-A	24R13	P-3052		PM8420	24R13	R-10B

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	LAFAYETTE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	4600Ω CT	16Ω Tap @ 8Ω	T-154	24S55	A-3028 ①	AU-609	A-3870	24S55	S-55X	① Drill new mounting hole.

MISCELLANEOUS

ITEM No.	PART NAME	LAFAYETTE PART No.	NOTES
M1	Switch	RS-830	Selector
M2	Switch	RS-839-2	Monitor
M3	Switch	RS-839-2	Rumble Filter

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

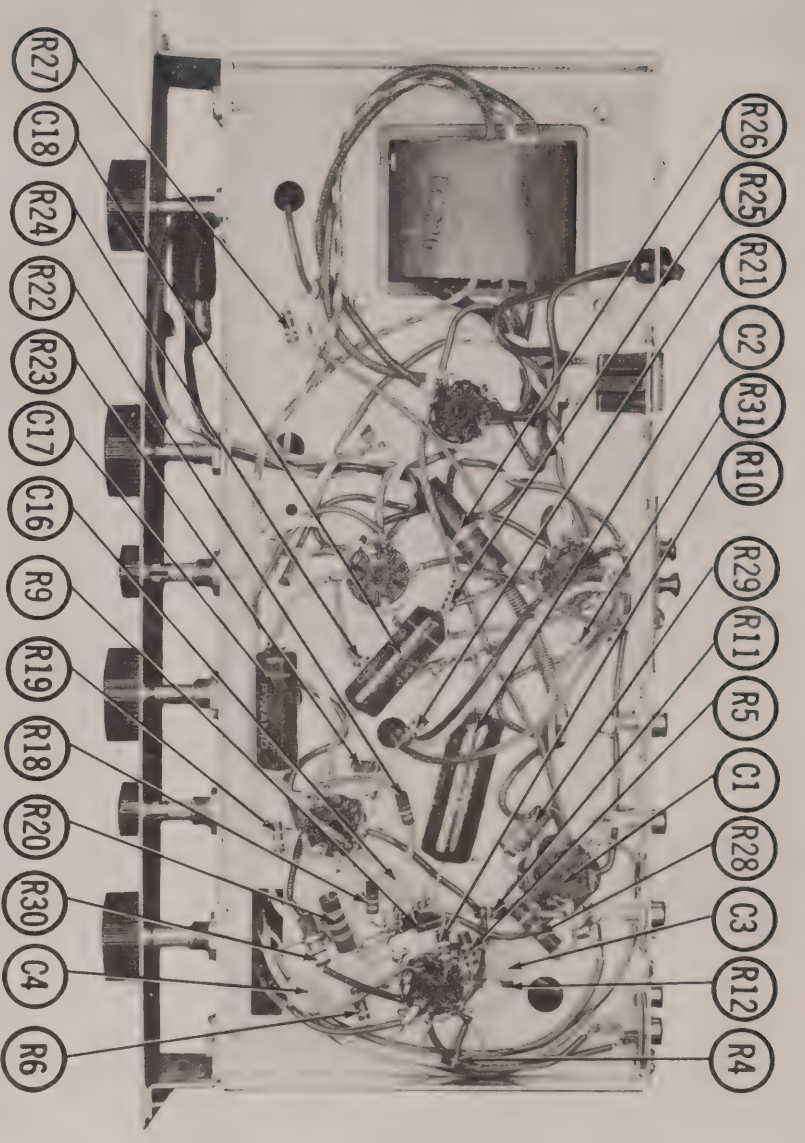
NAME	PART NO.	DESCRIPTION
Knob	K-483-1	All controls and switches except Monitor and Rumble Filter
Knob	K-486-1	Monitor and Rumble Filter

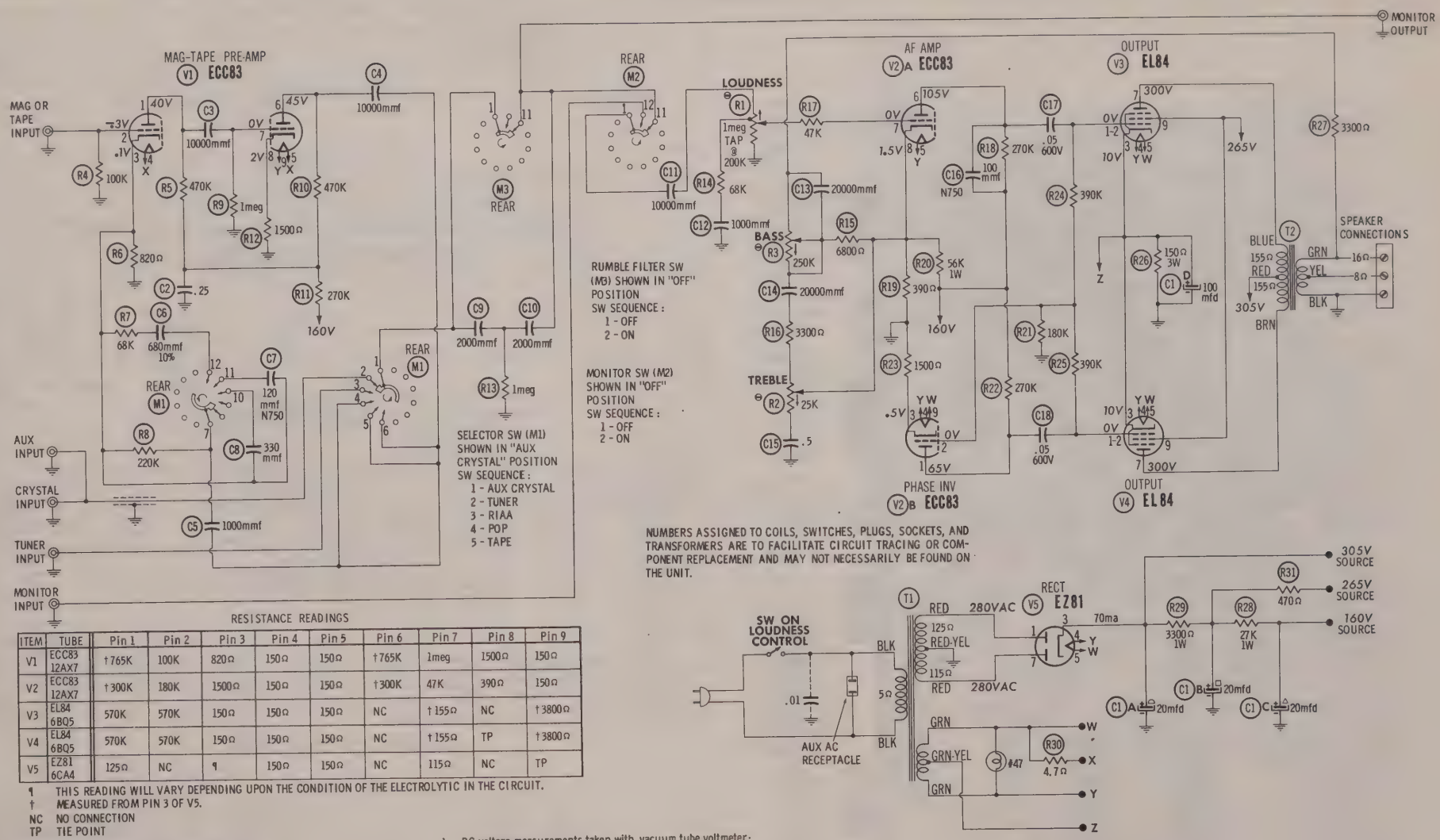
WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

CHASSIS BOTTOM VIEW





NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC83 12AX7	†765K	100K	820Ω	150Ω	150Ω	†765K	1meg	1500Ω	150Ω
V2	ECC83 12AX7	†300K	180K	1500Ω	150Ω	150Ω	†300K	47K	390Ω	150Ω
V3	EL84 6BQ5	570K	570K	150Ω	150Ω	150Ω	NC	†155Ω	NC	†3800Ω
V4	EL84 6BQ5	570K	570K	150Ω	150Ω	150Ω	NC	†155Ω	TP	†3800Ω
V5	EZ81 6CA4	125Ω	NC	¶	150Ω	150Ω	NC	115Ω	NC	TP

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 3 OF V5.
NC NO CONNECTION
TP TIE POINT

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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LAFAYETTE MODEL LA45

PHOTOFACT* Folder with CIRCUITRACE*

EIA

MOTOROLA MODELS 7X25P, W (Ch. HS-678)

MOTOROLA MODELS 7X25P, W (Ch. HS-678)

MODEL 7X25P

TRADE NAME	Motorola Models 7X25P, 7X25W (Ch. HS-678)
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	Battery Operated Portable Transistorized AM Receiver
POWER SUPPLY	6 Volts DC
RATING	7.1MA @ 6 Volts DC (No Signal, Min. Volume)
TUNING RANGE—BROADCAST	535 - 1620KC
	12MA @ 6 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1, A2, A3, A6 ..... GENERAL CEMENT #8282, 8606, 8606L, 9091
WALSCO #2506, 2541, 2543, 2544
A4, A5 ..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400~ Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	1620KC	"	"	A4	"
3.		"	1400KC	1400KC	"	A5	"
	The following steps to be performed only if the oscillator coil has been replaced or tampered with. Set A4 1/8 turn from tight and A5 3/8 turn from tight.						
4.		Loop	600KC	600KC signal	Across voice coil	A6	Adjust for maximum output while rocking tuning gang.
5.		"	1620KC	Tuning gang fully open	"	A4	Adjust for maximum output. Repeat steps 4 and 5.
6.		"	1400KC	1400KC signal	"	A5	Adjust for maximum output.

DISASSEMBLY INSTRUCTIONS

DISASSEMBLY

1. Remove volume and tuning knobs by pulling off.
2. Loosen cabinet back mounting screw.
3. Insert coin into slot and twist to remove cabinet back.
4. Remove three printed board mounting nuts.
5. Unscrew earphone jack nut.
6. Lift out printed board.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of JF374

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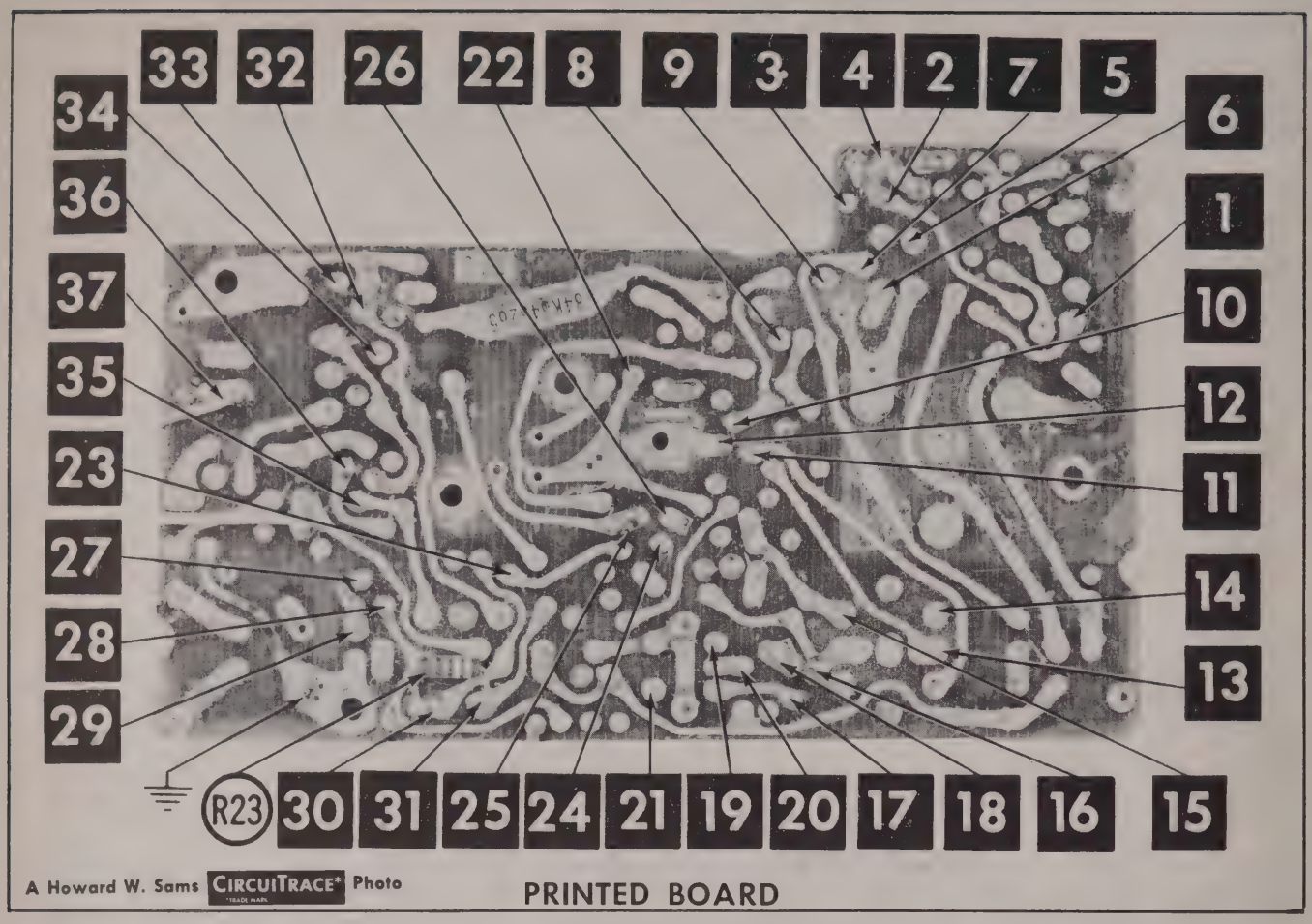

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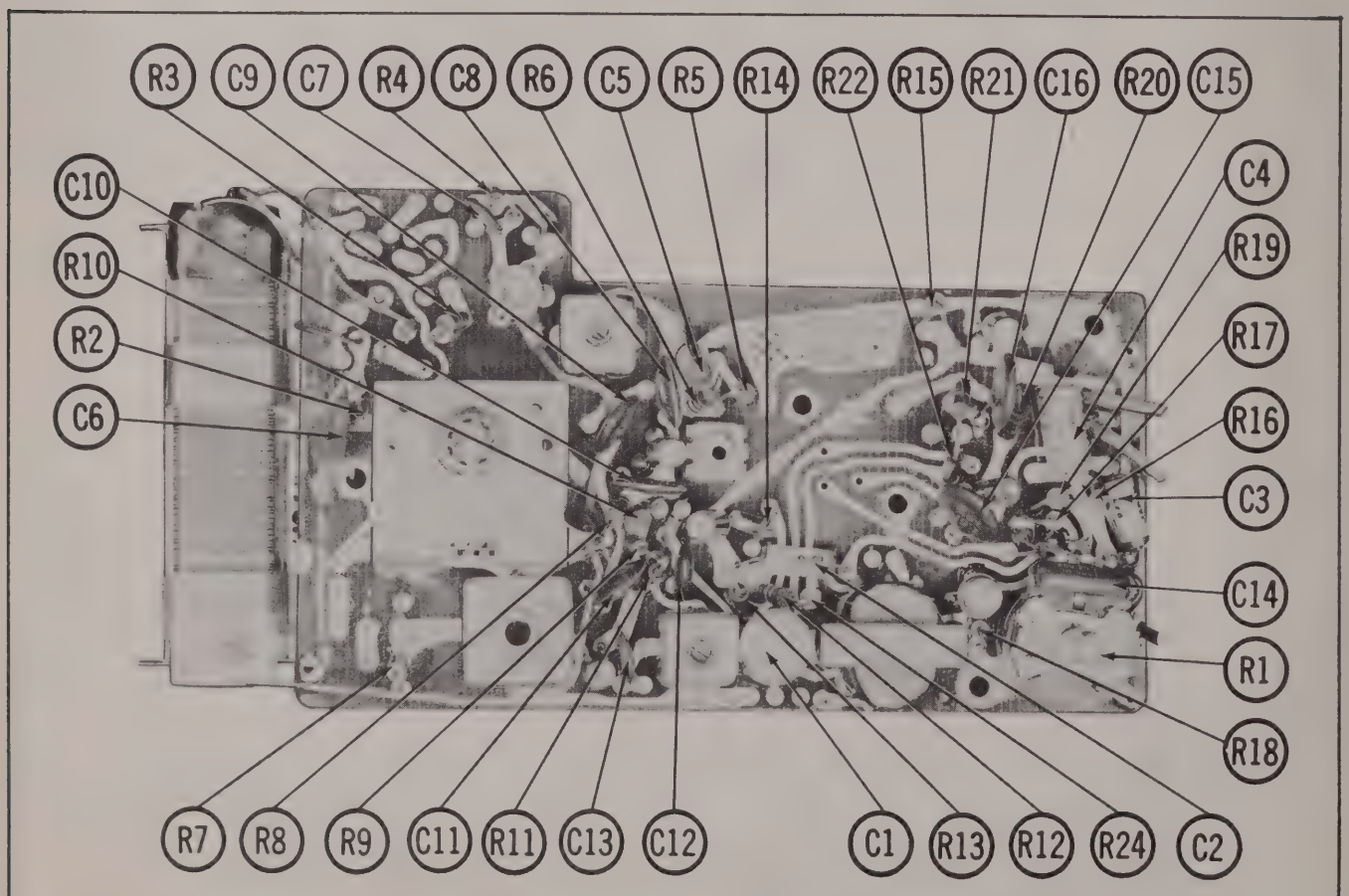
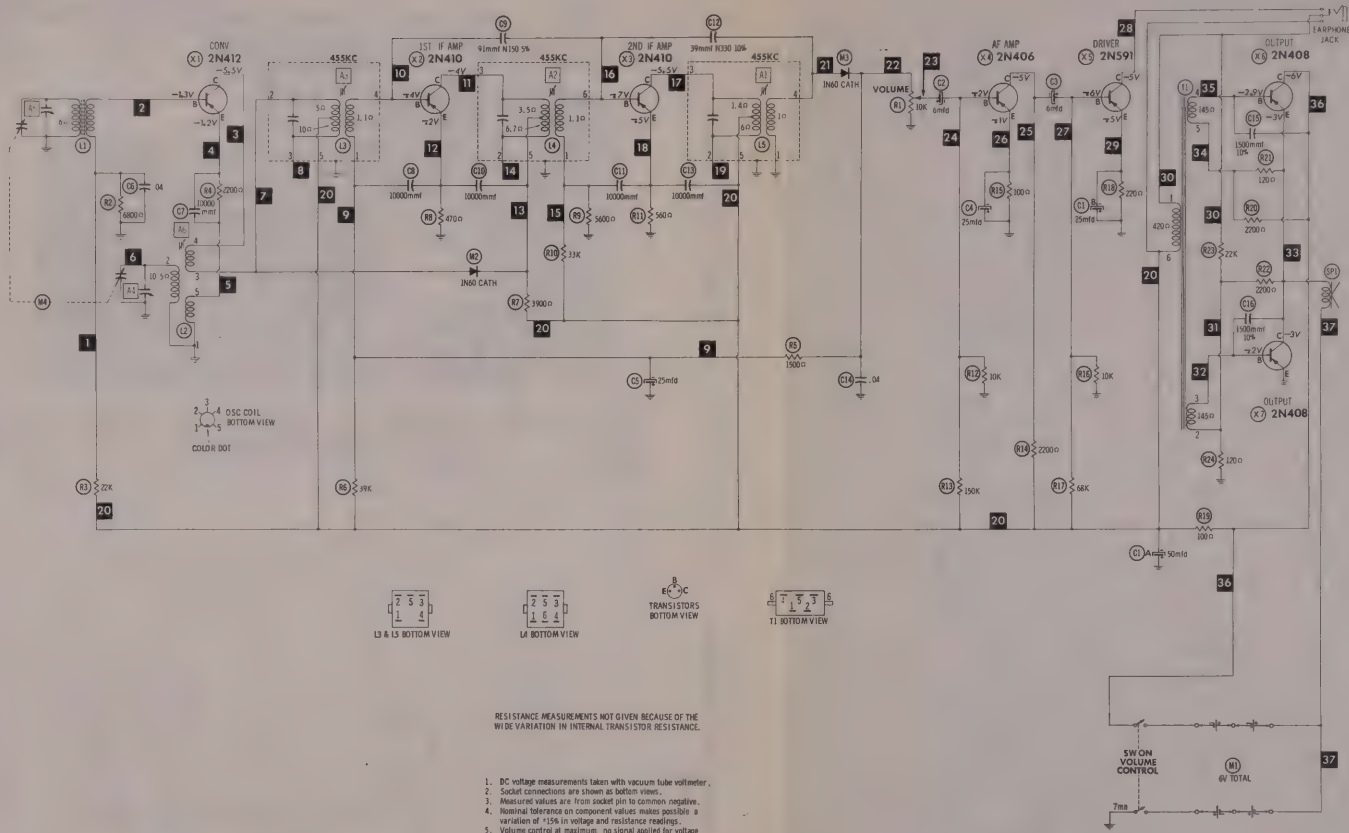
PRINTED BOARD



CHASSIS TOP VIEW—CAPACITOR RESISTOR IDENTIFICATION



RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE

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MOTOROLA MODELS 7X25P, W (Ch. HS-678)

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N412	Converter		2N412	2N486	2N412	PNP
X2	2N410	1st IF Amplifier		2N410	2N483	2N410	PNP
X3	2N410	2nd IF Amplifier		2N410	2N483	2N410	PNP
X4	2N406	AF Amplifier		2N406	2N362	2N406	PNP
X5	2N591	Driver		2N591	2N362	2N591	PNP
X6	2N408	Output		2N408	2N631	2N408	PNP
X7	2N408	Output		2N408	2N631	2N408	PNP

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	50	10	23B639917	BCD10X5030		PET2365C		VLS-2245 *	
B	25	10							
C2	6	10	23K636769	XPP-10006	NLW10-6	TT12X5	ML6-15	TE-1127.1	
C3	6	10	23K636769	XPP-10006	NLW10-6	TT12X5	ML6-15	TE-1127.1	
C4	25	10	23K642709	PWE-10025	NLW25-10	TT10X25	ML30-15	TE-1118	
C5	25	10	23K642709	XPP-10025	NLW25-10	TT10X25	ML30-15	TE-1118	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C6	.04 50V		P285N-04	DF-403	BYB6S4	1DP-2-403	GTM-114	4TM-S4
C7	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C8	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C9	91 N150 5%	#21R128601				*		
C10	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C11	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C12	39 N330 10%	#21R128600				*		
C13	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C14	.04 50V		P285N-04	DF-403	BYB654	1DP-2-403	GTM-114	4TM-S4
C15	1500 10%		DI-1500	DD-152	L10D15	CCS-152	JL-215	10TS-D15
C16	1500 10%		DI-1500	DD-152	L10D15	CCS-152	JL-215	10TS-D15

\# Motorola Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	10K	½	18B642934					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	6800Ω	
R3	22K	
R4	2200Ω	
R5	1500Ω	
R6	39K	
R7	3900Ω	
R8	470Ω	
R9	5600Ω	

ITEM No.	RATING	REMARKS
R10	33K	
R11	560Ω	
R12	10K	
R13	150K	
R14	2200Ω	
R15	100Ω	
R16	10K	
R17	68K	

ITEM No.	RATING	REMARKS
R18	220Ω	
R19	100Ω	
R20	2200Ω	
R21	120Ω	
R22	2200Ω	
R23	22K	
R24	120Ω	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		MOTOROLA PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	1V642924						①
L2	Osc. Coil	24K643767						
L3	1st IF Trans.	24C641755						
L4	2nd IF Trans.	24D642133						
L5	3rd IF Trans.	24K641756						

① Includes Ant. shield and mounting clamps.

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.1	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2	:1	25K642937						
		SEC.2							
	2	:1							

PARTS LIST AND DESCRIPTIONS

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	3½"	PM	15Ω	50K642938		

BATTERIES

ITEM No.	VOLTAGE	MOTOROLA PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V			930		1015		M15	Four required

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		MOTOROLA PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N60	48K640754	1N60	1N60	1N60	Overload (Pigtail)
M3	1N60	48K640754	1N60	1N60	1N60	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M4	Tuning Cap.	19K643316	2 Gang, Ant. 11-134mmf, Osc. 15-100mmf

CABINETS & CABINET PARTS

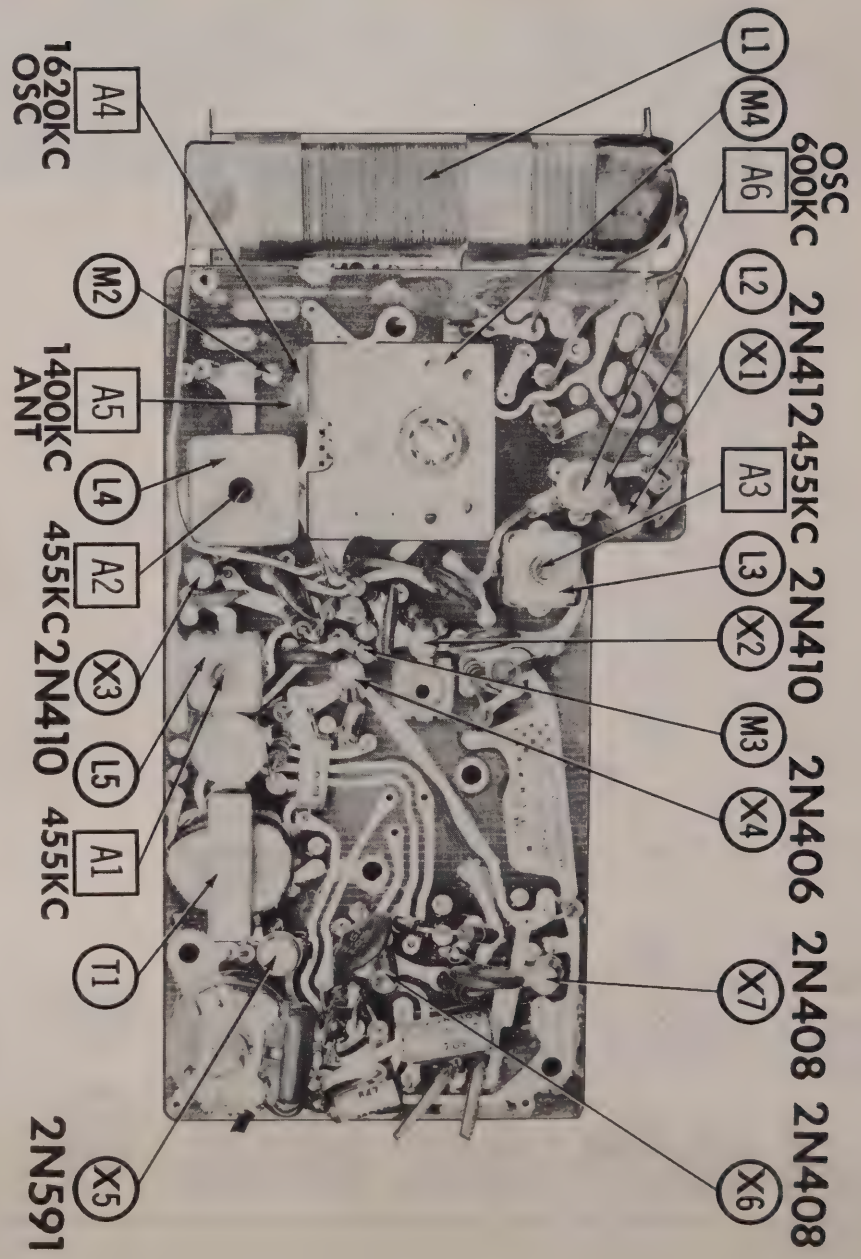
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	36C641718	Tuning
Knob	36C641716	Volume
Cabinet Front	1V643017	Salmon, Includes Dial Scale, Model 7X25P
Cabinet Front	1V643018	Antique-White, Includes Dial Scale, Model 7X25W
Cabinet Back	1V642953	Salmon, Model 7X25P
Cabinet Back	1V642954	Antique-White, Model 7X25W
Dial Scale	34B641713	
Handle	55K641726	

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW

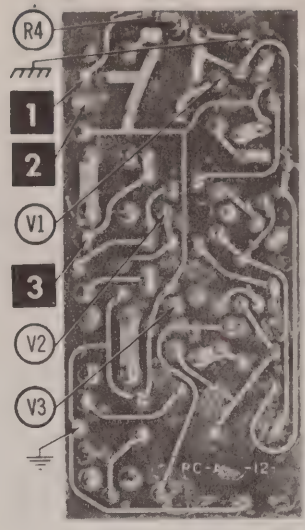


PHOTOFACT* Folder with CIRCUITRACE*

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

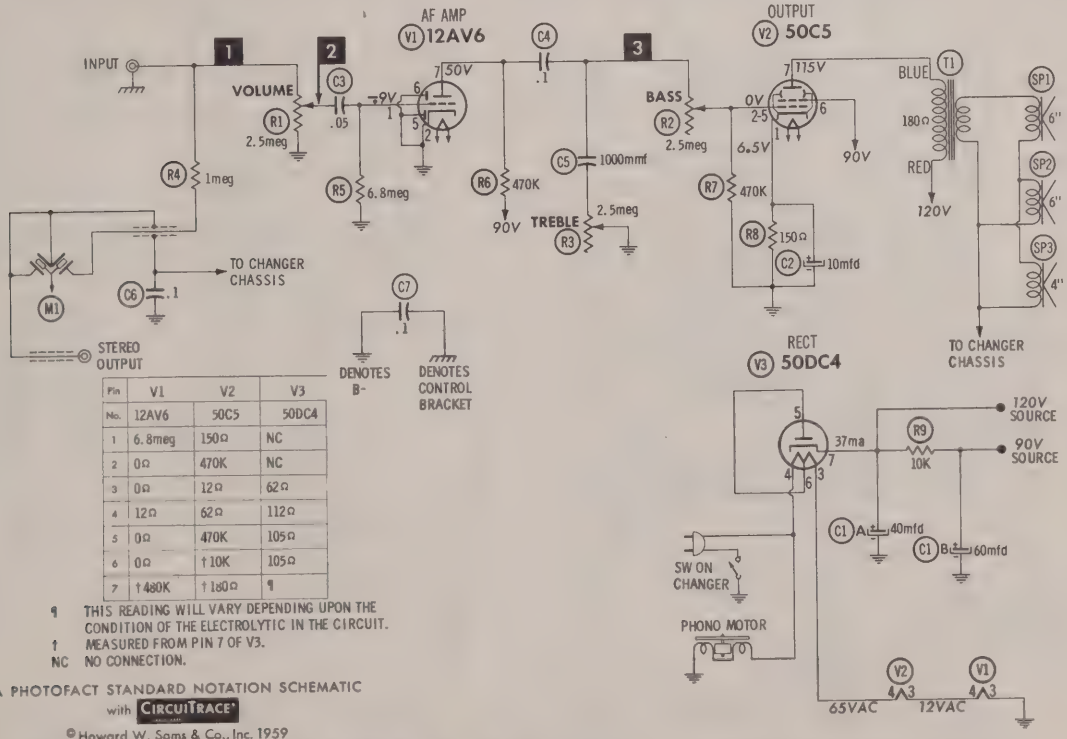
OLYMPIC
MODEL CR-58

OLYMPIC
MODEL CR-58



A Howard W. Sams CIRCUITRACE* Photo ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1

TRADE NAME	Olympic Model CR-58
MANUFACTURER	Olympic Radio & Tel. Inc., 34-01 38th Ave., Long Island City, 1 N. Y.
TYPE SET	AC Operated 3 Tube Phono Amplifier With 4 Speed Manual Record Player
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 22 Watts, .25 Amp. @117 Volts AC (Less Motor)



Pin No.	V1 12AV6	V2 50C5	V3 50DC4
1	6.8meg	150Ω	NC
2	0Ω	470K	NC
3	0Ω	12Ω	62Ω
4	12Ω	62Ω	112Ω
5	0Ω	470K	105Ω
6	0Ω	†10K	105Ω
7	†480K	†180Ω	¶

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 7 OF V3.
NC NO CONNECTION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE*

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JS331

SET 467 FOLDER 11

PARTS LIST AND DESCRIPTIONS

TUBES

• CBS •		GENERAL ELECTRIC •		RAYTHEON •		SYLVANIA •	
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1 V2	AF Amplifier Output	12AV6 50C5	V3	Rectifier	50DC4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	OLYMPIC PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	40	150		PRS150V5050	BBRD5515	TCD497	TDLD-9	TVA-2453	
B	60	150		XPP-25010	NLW10-25	TT10X25	ML10-25	TE-1204	
C2	10	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	.05 200V		P288N-05	DF-503	CUB2S5	4DP-3-503	GEM-215	2TM-S5
C4	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C5	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C6	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C7	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	OLYMPIC PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	2.5meg	1/2	VC59					Volume
R2	2.5meg	1/2	VC59					Bass
R3	2.5meg	1/2	VC59					Treble

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	1meg	
R5	6.8meg	

ITEM No.	RATING	REMARKS
R6	470K	
R7	470K	

ITEM No.	RATING	REMARKS
R8	150Ω	
R9	10K	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2300Ω	4-6Ω		22S45	A-2928	AU-603	A-3876	22S45	S-1X	

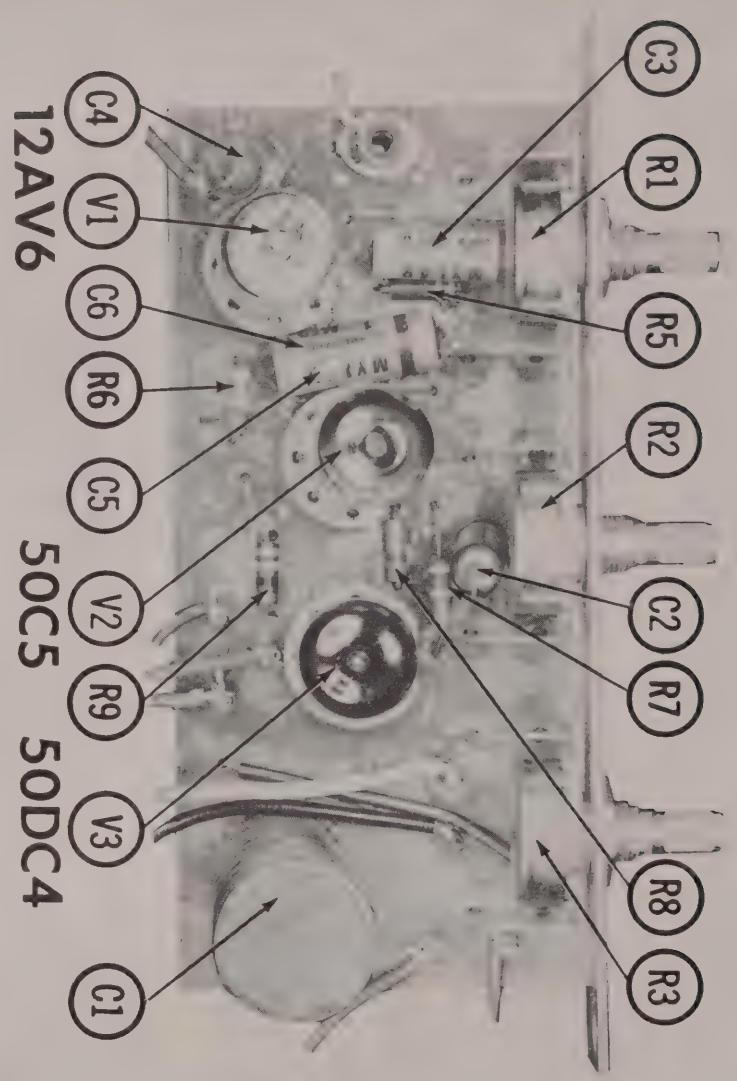
SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	OLYMPIC PART No.	QUAM PART No.	
SP1	6"	PM	3-4Ω	①	6A1 ①	① Connect SP1 In series with parallel combination of SP2 and SP3 and Phase.
SP2	6"	PM	3-4Ω	①	6A1 ①	
SP3	4"	PM	3-4Ω	①	4A07 ①	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA								
	OLYMPIC PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		SONOTONE PART No.	
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE
M1									

CHASSIS—TOP VIEW



WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

PHOTOFACT* Folder

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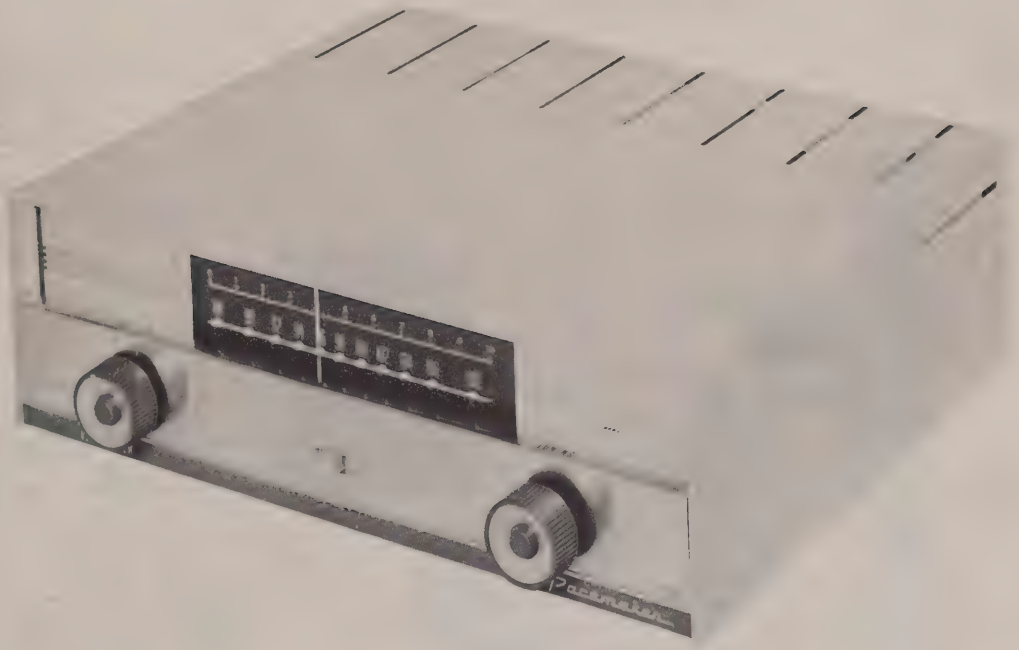
PACEMAKER MODEL 2216

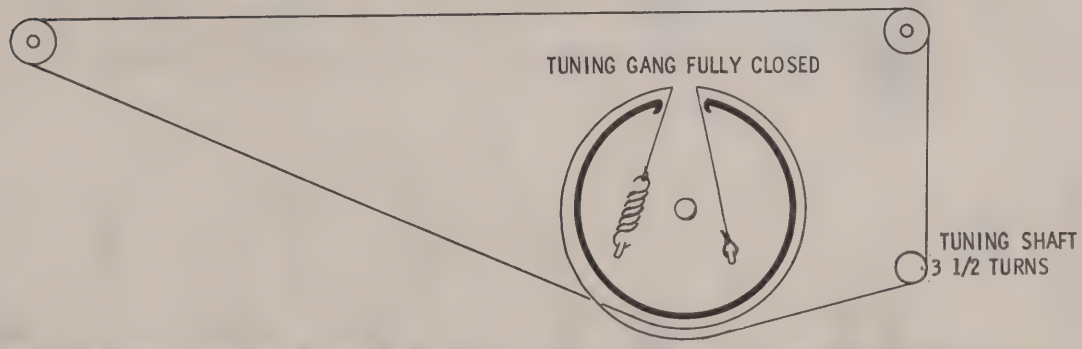
PACEMAKER
MODEL 2216



PACEMAKER
MODEL 2216

TRADE NAME	Pacemaker Model 2216
MANUFACTURER	Bell Sound Div., Thompson Ramo Wooldridge Inc., 555 Marion Road, Columbus, Ohio
TYPE SET	AC Operated 7 Tube FM Tuner
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 32 Watts, .35 Amp. @ 117 Volts AC
TUNING RANGE	FREQ. MOD. 88 - 108MC

DIAL CORD STRINGING



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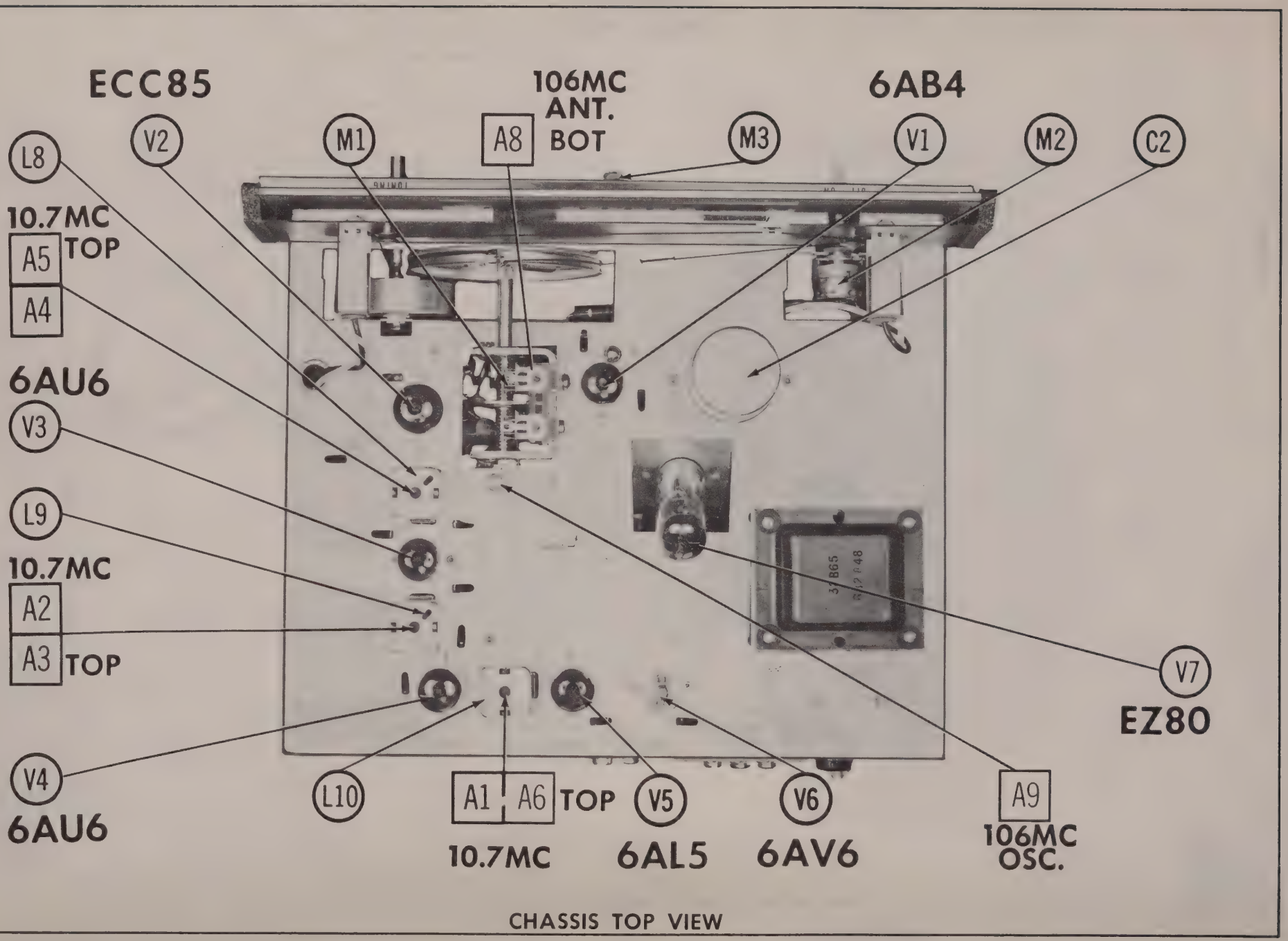


CHASSIS TOP VIEW

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:

A1 thru A6	GENERAL CEMENT #5097, 8727 WALSCO #2515
A7	GENERAL CEMENT #8606, 8606L, 8282, 9295 WALSCO #2526, 2543, 2544, 2545
A8, A9	GENERAL CEMENT #5004, 5008, 5009 WALSCO #2520

IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	10mmf Ceramic Capacitor	High side to RF stator lug of tuning gang. Low side to chassis.	10.7MC (Unmod.)	Point of non-interference	DC probe thru 100K to point (A). Common to chassis.	A1, A2, A3, A4, A5	Adjust for maximum deflection.
2.	"	"	"	"	DC probe thru 100K to point (B). Common to chassis.	A6	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1.	10mmf Ceramic Capacitor	High side to RF stator lug of tuning gang. Low side to chassis.	10.7MC (450KC Swp.)	Point of non-interference	Vert. Amp. thru 100K to point (A). Low side to chassis.	A1, A2, A3, A4, A5	Disconnect Stabilizing Capacitor C3. Adjust for maximum gain and symmetry similar to Fig. 1.
2.	"	"	"	"	Vert. Amp. thru 100K to point (B). Low side to chassis.	A6	Reconnect C3. Adjust to place marker at the center of crossover lines similar to Fig. 3. SLIGHTLY retouch A1 for maximum amplitude and straightness of crossover lines.

RF ALIGNMENT

Adjustments must be made so that calibration is correct when bottom cover is in place.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
3.	270Ω Carbon Resistor	Across FM antenna terminals with 270Ω in high side.	90MC (Unmod.)	90MC	DC probe thru 100K to point (A). Common to chassis.	A7	Adjust for maximum deflection.
4.	"	"	106MC	106MC	"	A8, A9	Adjust for maximum deflection.
5.	"	"	90MC	90MC	"	L4	Adjust for maximum deflection.

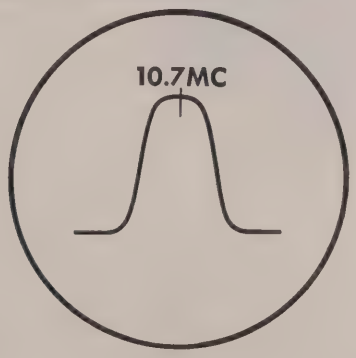


FIG. 1

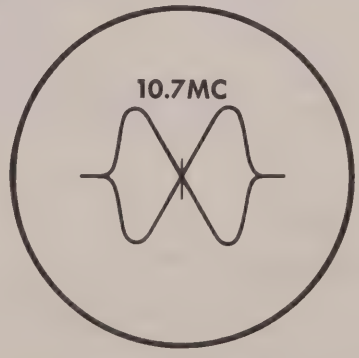
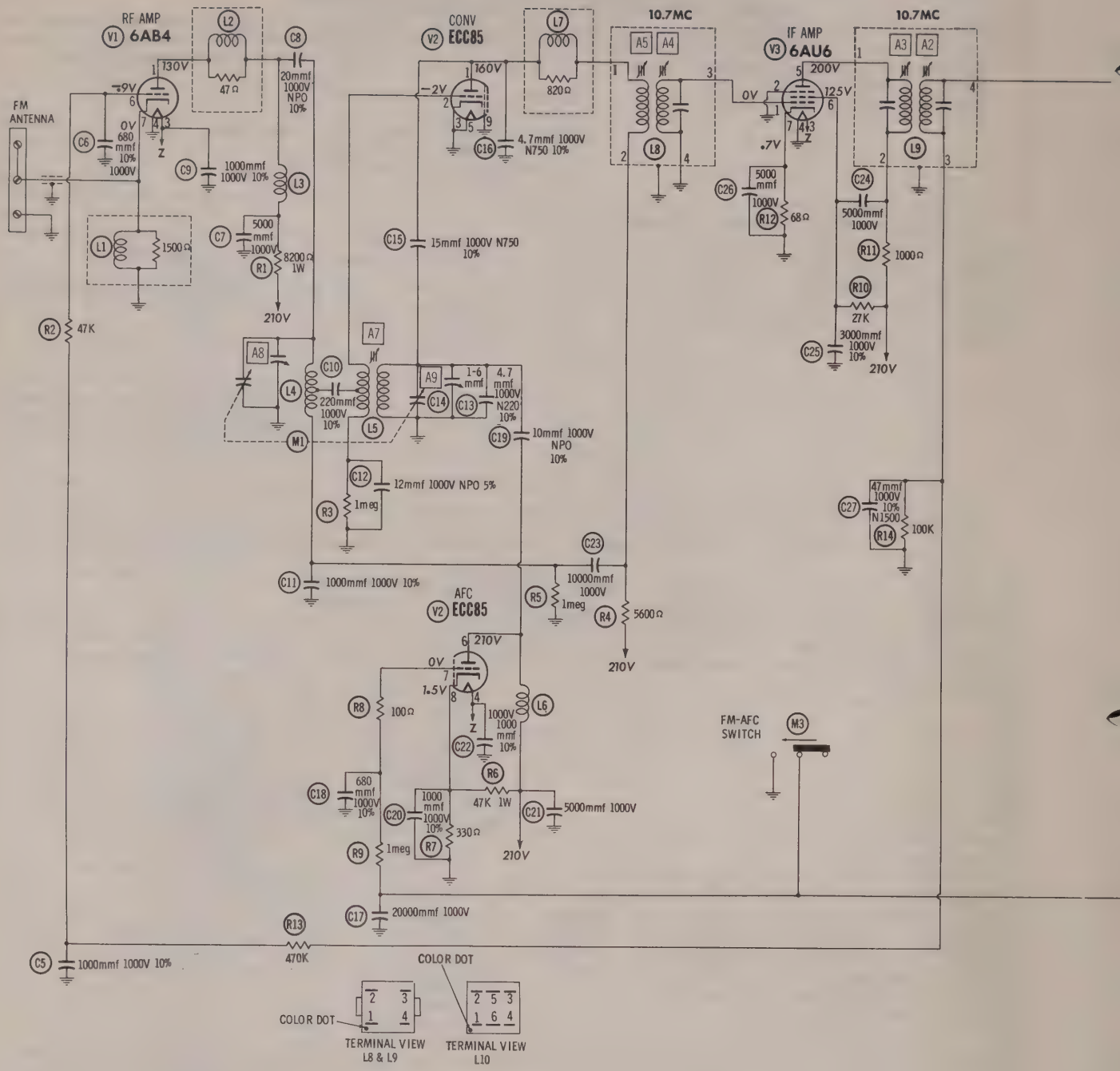


FIG. 2



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. No signal applied for voltage measurements.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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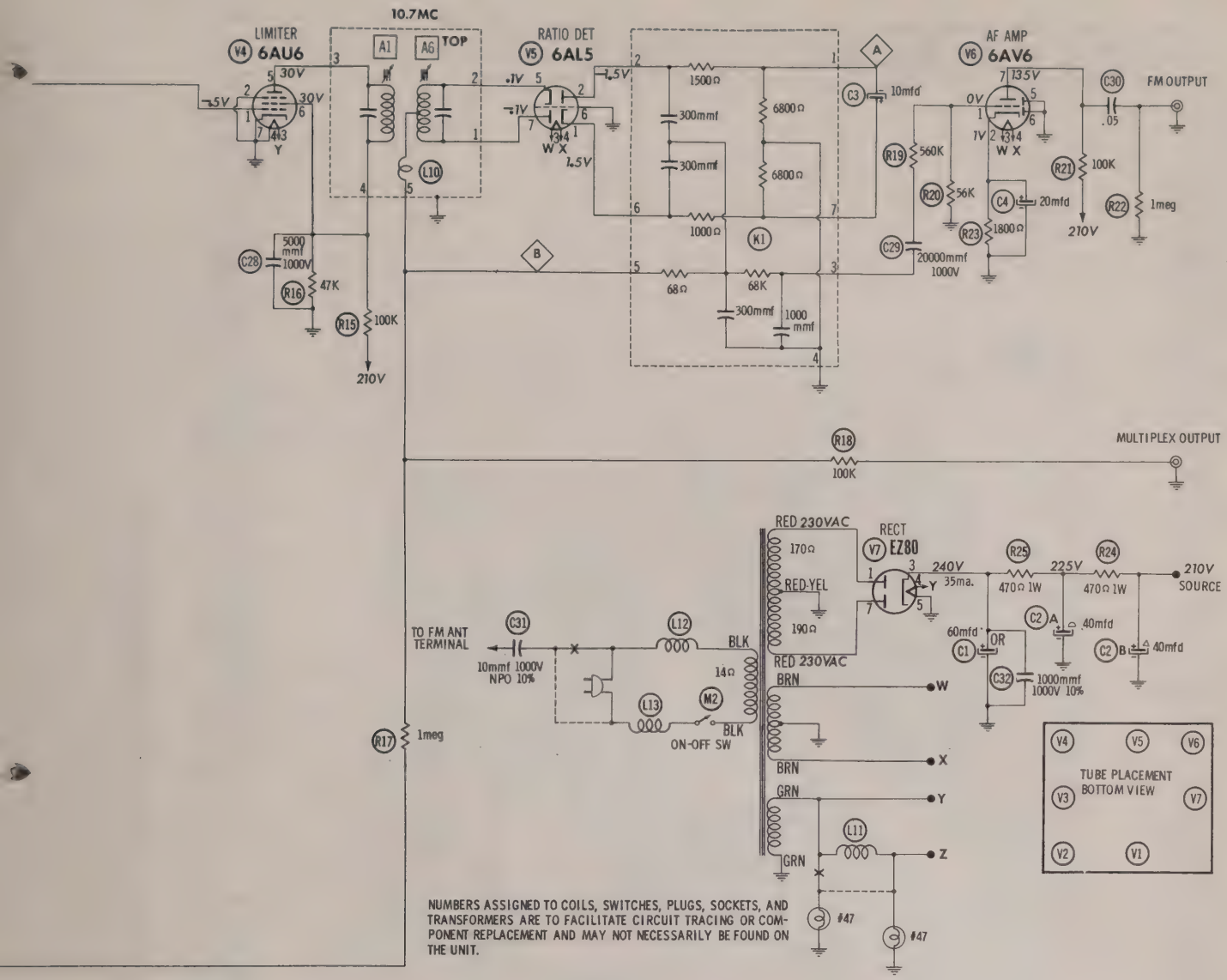
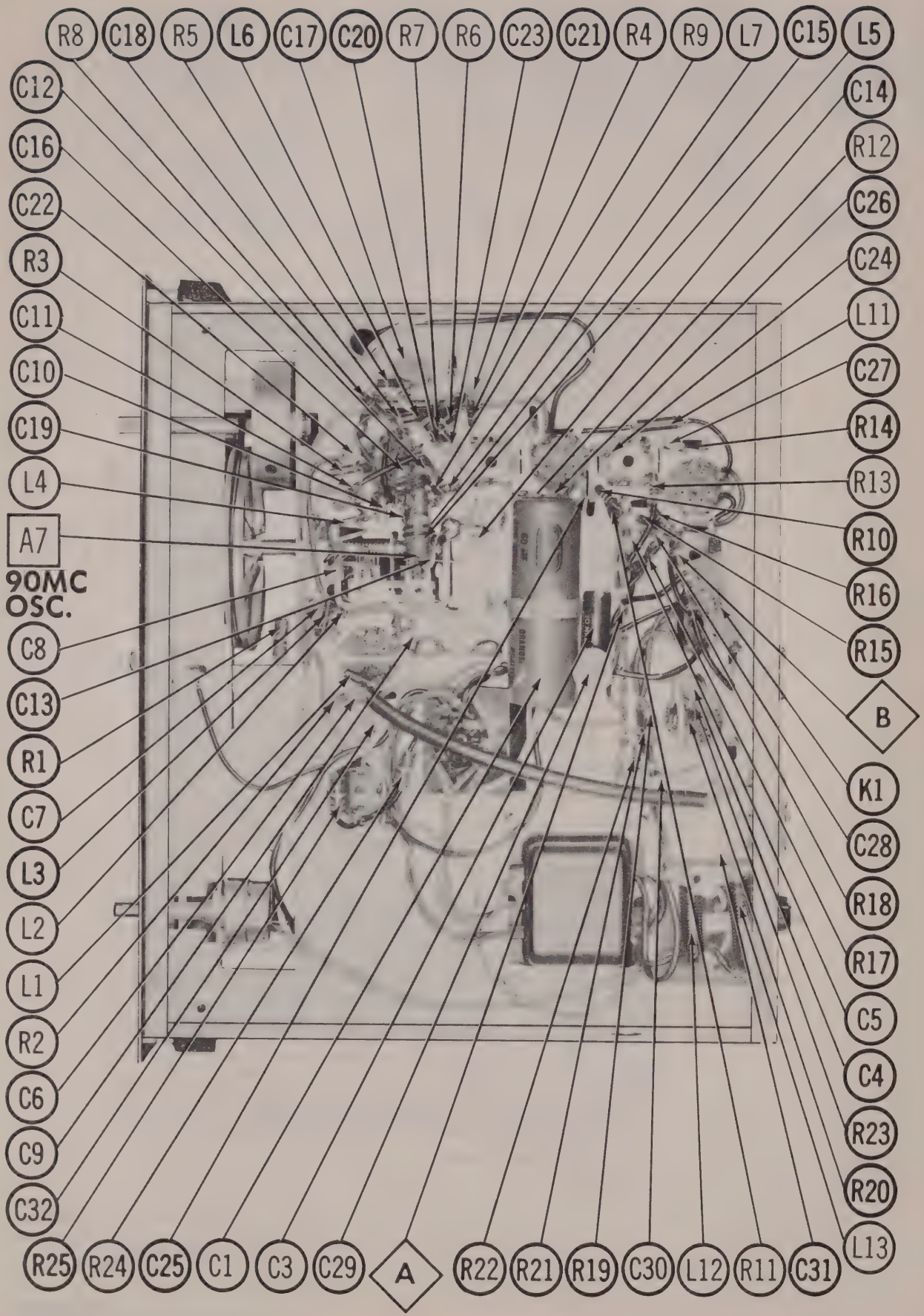


NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AB4	†9200Ω	TP	.1Ω	0Ω	TP	620K	.1Ω		
V2	ECC85 6AQ8	†6500Ω	1meg	0Ω	.1Ω	0Ω	†950Ω	1meg ▪ INF	330Ω	0Ω
V3	6AU6	.5Ω	0Ω	.1Ω	0Ω	†1900Ω	†28K	68Ω		
V4	6AU6	100K	0Ω	.1Ω	0Ω	†50K	†50K	0Ω		
V5	6AL5	7800Ω	8300Ω	.1Ω	.1Ω	1meg	0Ω	1meg		
V6	6AV6	56K	1800Ω	.1Ω	.1Ω	0Ω	0Ω	†100K		
V7	EZ80 6V4	170Ω	NC	¶	.1Ω	0Ω	NC	190Ω	NC	NC

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 3 OF V7.
▪ MEASURED IN "FM-AFC" POSITION.
NC NO CONNECTION.
TP TIE POINT.



CHASSIS-BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE (CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA)
V1	RF Amplifier	6AB4
V2	Converter-AFC	ECC85/6AQ8
V3	IF Amplifier	6AU6
V4	Limiter	6AU6
V5	Ratio Detector	6AL5
V6	AF Amplifier	6AV6
V7	Rectifier	EZ80/6V4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA Bell Sound PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	60	300	23B50	PRS1770	BR6035	TC68	TD-60-350	TVA-1613	
C2A	▲40	300	23B49	AFH3-100	D0016	FP217.87		TVLS-2575.1*	
B	▲40	300							
C3	10	50	23B45	SRE50V10	NLW10-50	TT50X10	ML10-50	TE-1304	
C4	20	6	23B8	XPP-6020	NLW20-6	TT15X20	ML20-6	TE-1090	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	1000 1000V 10%		DI-1000	DD-102	PM6D1	CCS-102	JL-210	10TS-D10
C6	680 1000V 10%		DI-680	DD-681	1R5T68	CCS-681	JL-368	10TS-T68
C7	5000 1000V		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C8	20 1000V NPO 10%		NPO-DI 20	DTZ-20	C10Q2C	CCTO-200	CNO-420	10TCC-Q20
C9	1000 1000V 10%		DI-1000	DD-102	PM6D1	CCS-102	JL-210	10TS-D10
C10	220 1000V 10%		DI-220	DD-221	LI0T22	CCD-221	JL-322	10TS-T22
C11	1000 1000V 10%		DI-1000	DD-102	PM6D1	CCS-102	JL-210	10TS-D10
C12	12 1000V NPO 5%			TCZ-12	C10Q12C	CCTO-120	CNO-412	10TCC-Q12
C13	4.7 1000V N220 10%	#24B93				*		10TCR-V47
C14	1-6	#25A8		829-6				
C15	15 1000V N750 10%		N750-DI 15	DTN-15	C10Q15U	CCTN-150	CN7-415	10TCU-Q15
C16	4.7 1000V N750 10%			DTN-5	C10V5U	CCTN-050	CN7-547	10TCU-V50
C17	20000 1000V		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C18	680 1000V 10%		DI-680	DD-681	1R5T68	CCS-681	JL-368	10TS-T68
C19	10 1000V NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C20	1000 1000V 10%		DI-1000	DD-102	PM6D1	CCS-102	JL-210	10TS-D10
C21	5000 1000V		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C22	1000 1000V 10%		DI-1000	DD-102	PM6D1	CCS-102	JL-210	10TS-D10
C23	10000 1000V		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C24	5000 1000V		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C25	3000 1000V 10%		DI-3000		PM6D3	CCS-302	JL-233	10TS-D30
C26	5000 1000V		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C27	47 1000V N1500 10%	#24A87		TCL-47		*		
C28	5000 1000V		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C29	20000 1000V		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C30	.05 400V		P488N-05	DF-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C31	10 1000V NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C32	1000 1000V 10%		DI-1000	DD-102	PM6D1	CCS-102	JL-210	10TS-D10

\# Bell Sound Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R1	8200Ω 1W	
R2	47K	
R3	1meg	
R4	5600Ω	
R5	1meg	
R6	47K 1W	
R7	330Ω	
R8	100Ω	
R9	1meg	
R10	27K	
R11	1000Ω	
R12	68Ω	
R13	470K	
R14	100K	
R15	100K	
R16	47K	
R17	1meg	
R18	100K	
R19	560K	
R20	56K	
R21	100K	
R22	1meg	
R23	1800Ω	
R24	470Ω 1W	
R25	470Ω 1W	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA Bell Sound PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Ant. Coil	31A20						①
L2	RF Choke	31A31						②
L3	RF Choke	31A24	19-2006	19-2006	BC-560	4590		.68uh
L4	RF Coil	31A28						
L5	Osc. Coil	31B29						
L6	RF Choke	31A22	19-1002	19-1002	BC-563	4606		2.5uh
L7	RF Choke	31A19						③
L8	1st IF Trans.	32C44	16-3487	16-3487	FM-254	1463		
L9	2nd IF Trans.	32C24	16-3487	16-3487	FM-254	1463		
L10	Ratio Det.	32C66	17-3498	17-3498	FM-255	1465		
L11	Fil. Choke	31A21	19-1003	19-1003	BC-564	4608		3.8uh
L12	Line Choke	31B8						1.4uh
L13	Line Choke	31B8						1.4uh

① Wound on 1500Ω resistor. ② Two turns wire on 47Ω resistor. ③ Three turns wire on 820Ω resistor.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Bell Sound PART No.	REPLACEMENT DATA
K1	Detector Load	(3) 300mmf, 1000mmf, 68Ω, 1000Ω, 1500Ω, (2) 6800Ω, 68K	57A14	Centralab PC-342

MISCELLANEOUS

ITEM No.	PART NAME	Bell Sound PART No.	NOTES
M1	Tuning Cap.	25B10	FM (2 Gang)
M2	Switch	43A43	Off-On
M3	Switch	43A51	AFC-Off (SPDT, Slide Type)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	84A32	Off-On
Knob	84A31	Tuning
Pointer	72A229	
Dial Glass	94B36	

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

FOLDER 12

PACEMAKER MODEL 2216

PHOTOFACT* Folder with CIRCUITRACE*

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

PHILCO MODEL T-60 (Code 124)

PHILCO MODEL
T-60 (Code 124)

PHILCO MODEL
T-60 (Code 124)

TRADE NAME	Philco Model T-60 (Code 124)
MANUFACTURER	Philco Corp., Tioga & "C" Streets, Philadelphia, Pennsylvania
TYPE SET	Battery Operated Portable Transistorized AM Receiver
POWER SUPPLY	3 Volts DC
TUNING RANGE—BROADCAST	535 - 1620KC
RATING	9MA @ 3 Volts DC (No Signal, Min. Volume) 11MA @ 3 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:
A1, A2, A3 ..... GENERAL CEMENT #8607, 9291
WALSCO #2520, 2522, 2523, 2524, 2537
A4 ..... GENERAL CEMENT #8608, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545
A5, A6 ..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to antenna stator lug of tuning gang. Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3	Adjust for maximum output.
2.		Loop	600KC	600KC signal	"	A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output while rocking tuning gang.
3.		"	1620KC	Tuning gang fully open	"	A5	Adjust for maximum output.
4.		"	1400KC	1400KC signal	"	A6	Adjust for maximum output. Repeat steps 2, 3 and 4 until no further improvement is obtained.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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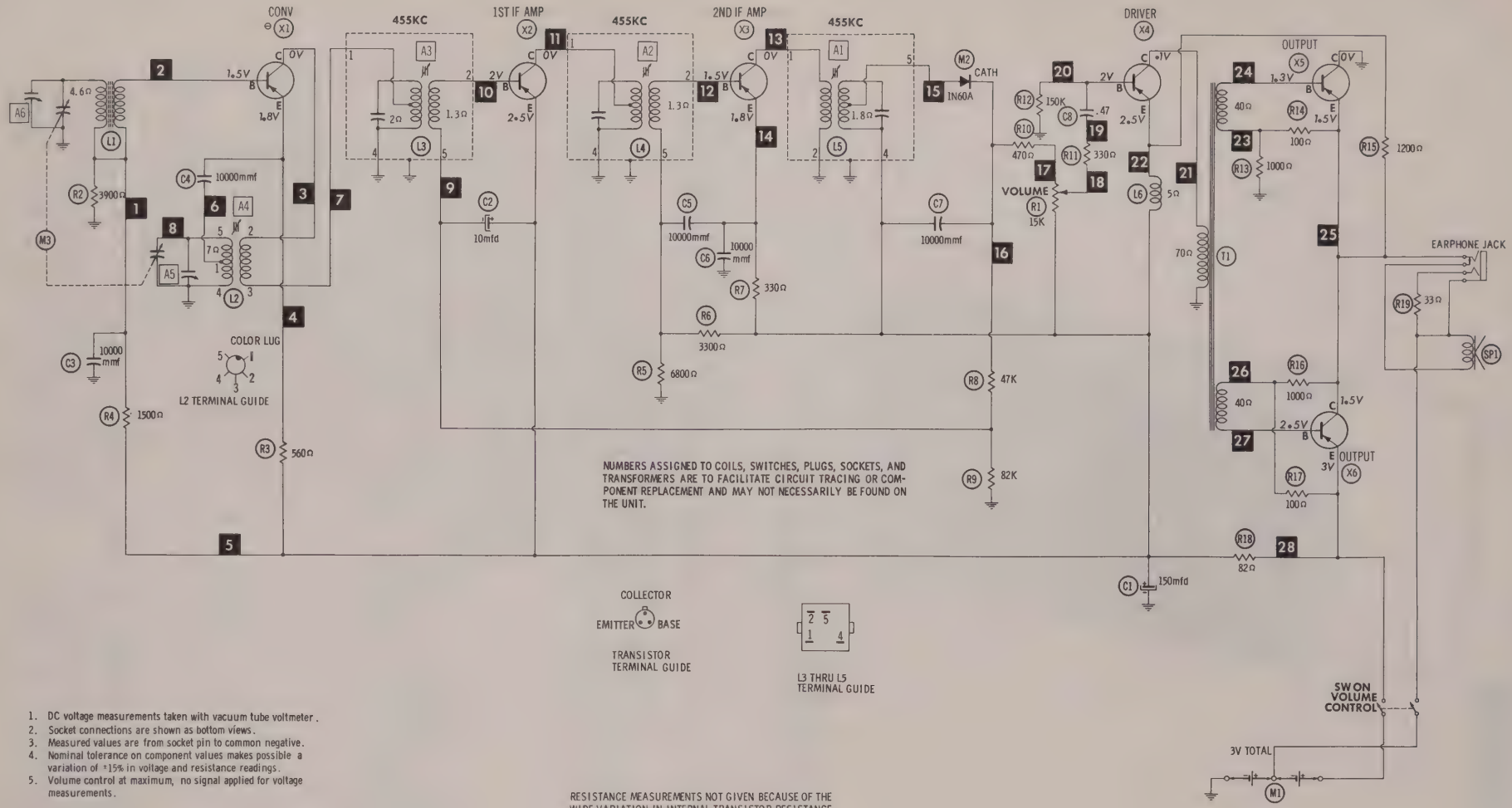

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

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PHILCO MODEL T-60 (Code 124)

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	MFGR. PART No.	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	34-6000-3	Converter (T-1033 ♦)	CBS2N180		2N486		PNP
X2	34-6000-18	1st IF Amp. (T-1459)			2N483		PNP
X3	34-6001-19	2nd IF Amp. (T-1460)			2N483		PNP
X4	34-6001-16	Driver (T-1001)			2N362		PNP
X5	34-6009	Output (T-1008)			2N632		PNP } Matched
X6	34-6009	Output (T-1008)			2N632		PNP } Pair

♦ Alternate Type #T-1300.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	150	3	30-2599-19	BCD3150	ECPA19			VL-1055	
C2	10	3	30-2599-8	BCD3010	ECPA8	PET1340	ML10-6	VL-1038	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C4	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C6	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C7	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C8	.47	#30-1274-3		TCZ-R5				

Philco Part Number.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	15K	1/4	33-5583-7					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	3900Ω	
R3	560Ω	
R4	1500Ω	
R5	6800Ω	
R6	3300Ω	
R7	330Ω	

ITEM No.	RATING	REMARKS
R8	47K	
R9	82K	
R10	470Ω	
R11	330Ω	
R12	150K	
R13	1000Ω	

ITEM No.	RATING	REMARKS
R14	100Ω	
R15	1200Ω	
R16	1000Ω	
R17	100Ω	
R18	82Ω	
R19	33Ω	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		PHILCO PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	76-10946-1						
L2	Osc. Coil	32-4669-2						
L3	1st IF Trans.	32-4775-1						
L4	2nd IF Trans.	32-4775-2						
L5	3rd IF Trans.	32-4775-3						
L6	Emitter Choke	32-4685-1	19-4400	19-4400	TV-202	6136		400uh

PRINTED BOARD

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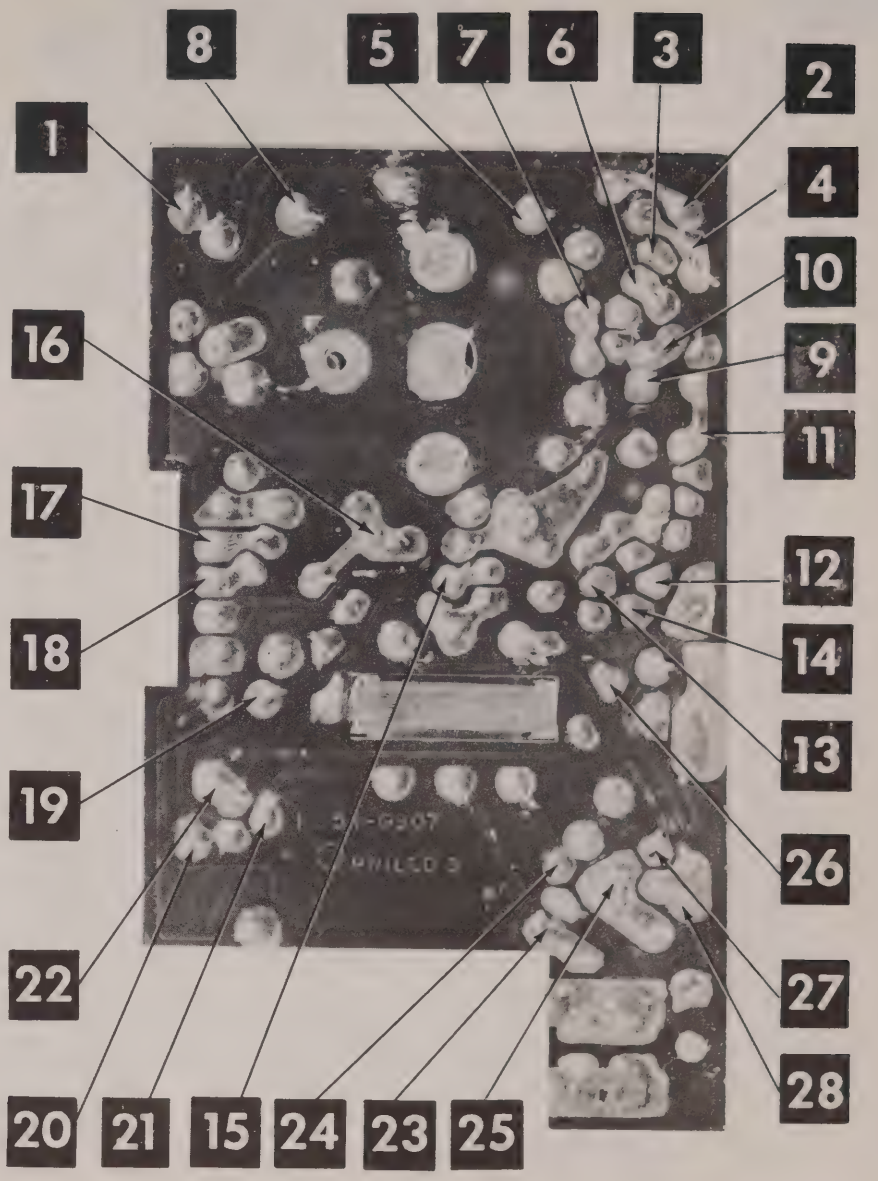


PHILCO MODEL T-60 (Code 124)

FOLDER 13

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.1	PHILCO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1.5	: 1 SEC.2 : 1	32-8885-1						

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	PHILCO PART No.	QUAM PART No.	
SP1	2 3/4"	PM	15-17Ω	36-1664-6		

BATTERIES

ITEM No.	VOLTAGE	PHILCO PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V	P15		930		1015		M-15R	Two required.

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		PHILCO PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N60A	34-8022-3	1N60	1N60	1N60	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M3	Tuning Cap. Printed Board	31-2782-1 54-6907	2 Gang

CABINETS & CABINET PARTS

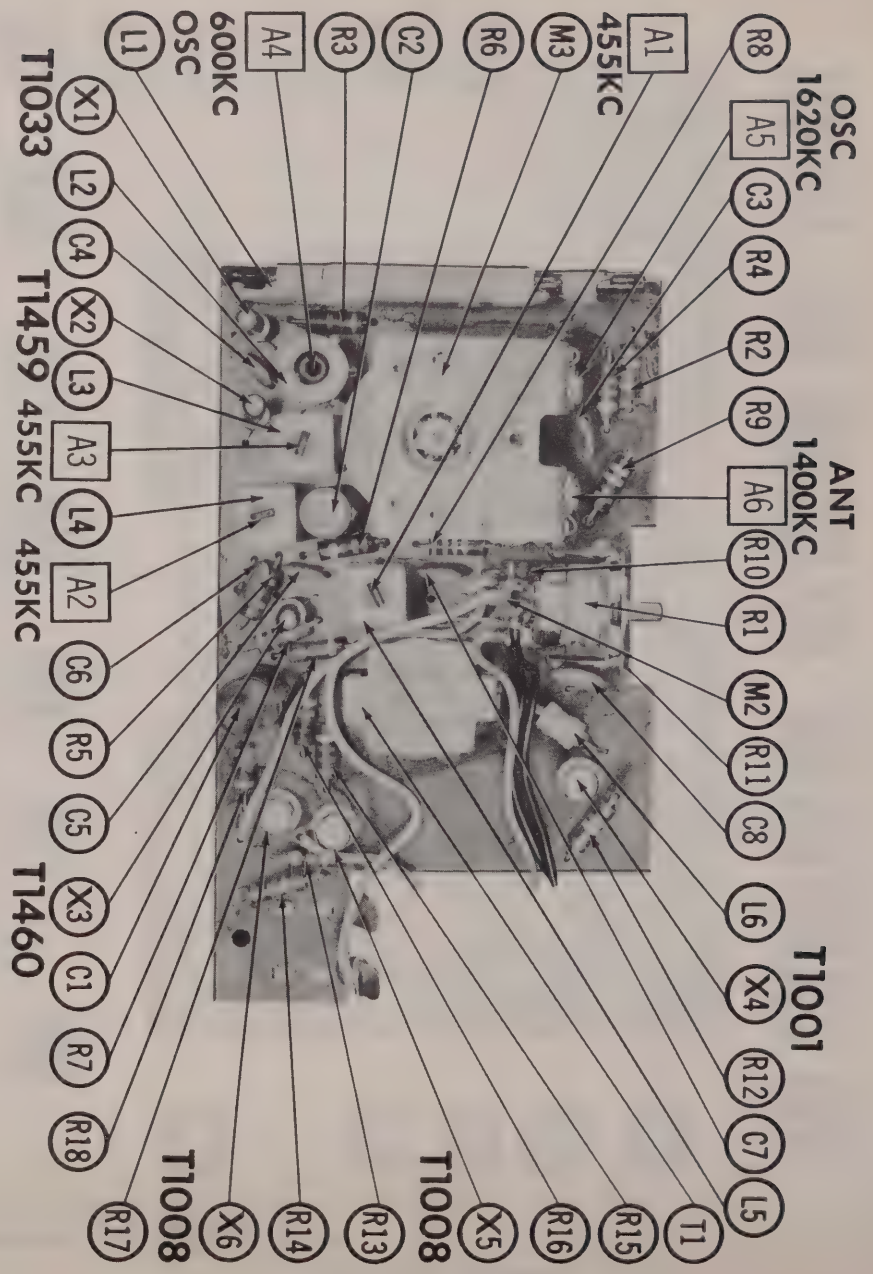
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	54-6911-1	Tuning, Ivory & Grey
Knob	54-6911	Tuning, Black
Knob	54-6912-1	Volume, Ivory & Grey
Knob	54-6912	Volume, Black
Cabinet Front	424-8006	Ivory & Grey
Cabinet Front	424-8006-1	Black
Cabinet Insert	54-5451-1	Ivory & Grey
Cabinet Insert	54-5451-2	Black
Handle	28-12724	

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW

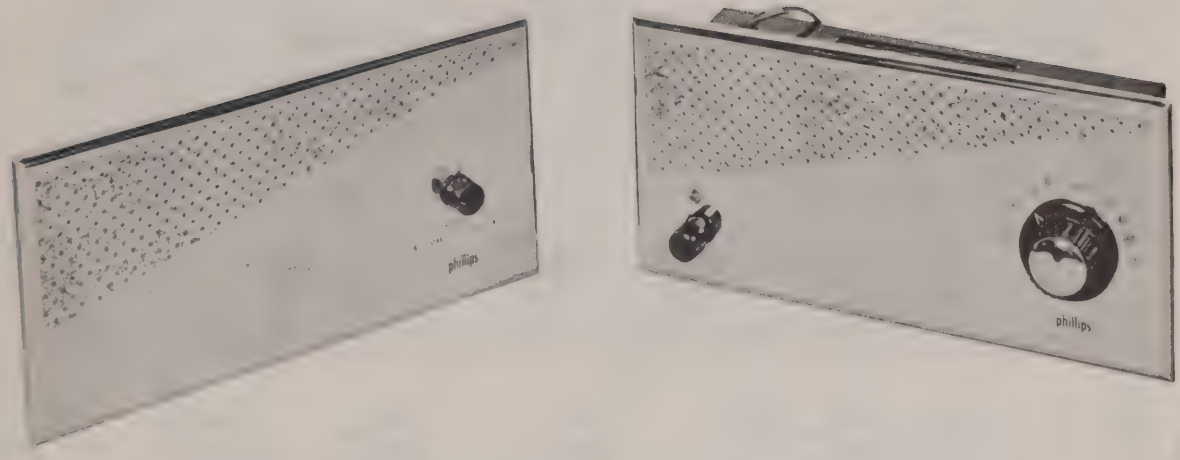


PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

PHILLIPS
MODEL R-100

PHILLIPS
MODEL R-100



PHILLIPS
MODEL R-100

TRADE NAME	Phillips Model R-100
MANUFACTURER	Phillips Radio Div., B-W Manufacturers, Inc., 721 N. Webster St., Kokomo, Indiana
TYPE SET	AC-DC Operated 5 Tube AM Receiver
POWER SUPPLY	110-120 Volts AC-DC
RATING	25 Watts, .28 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	530-1700KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1mfd capacitor in series with low side of signal generator. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools: A1 thru A4..... GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545
A5, A6..... GENERAL CEMENT #5097, 8727
WALSCO #2515

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400~ Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	1700KC	"	"	A5	"
3.		"	1400KC	Tune to 1400KC Signal	"	A6	Adjust for maximum output while rocking tuning gang.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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JG406

SET 467 FOLDER 14

PARTS LIST AND DESCRIPTIONS

TUBES

• CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA •					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Converter	12BE6	V4	Output	50C5
V2	IF Amplifier	12BA6	V5	Rectifier	35W4
V3	Det. -AVC-AF Amp.	12AV6			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	PHILLIPS PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	50	150		PRS4500	BBRT5315C	TCD3107	TDLT-15	TVA-3453	
B	30	150							
C	20	150	①						

① In some versions C1C is 25mfd.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	100 N1500			TCL-100				
C3	75		1469-000075	TCZ-75	22R5Q75	CM-20B-750M	MC230	MS-475
C4	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C5	250 N75 5%							
C6	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C7	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C8	10000	①	BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C9	.22 200V		P288N-22		CUB2P22	2DP-4-224	GEM-2022	2TM-P22

① Not used in some versions.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	PHILLIPS PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	HA-9135	B-60S	A47-500K-Z	Q13-133	U48	Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			Not Req.	SWE-12	76-1	US-26	Power Off-On
R2A	15Ω	2(WW)	EW-1620		A58S-15	WPK-20	R15L	Remote Volume
B	Shaft				FS-3	Not Req.	DS-36	
C	Switch				Not Req.	76-11	US30	Remote Speaker Off-On

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	22K	
R4	2.2meg	

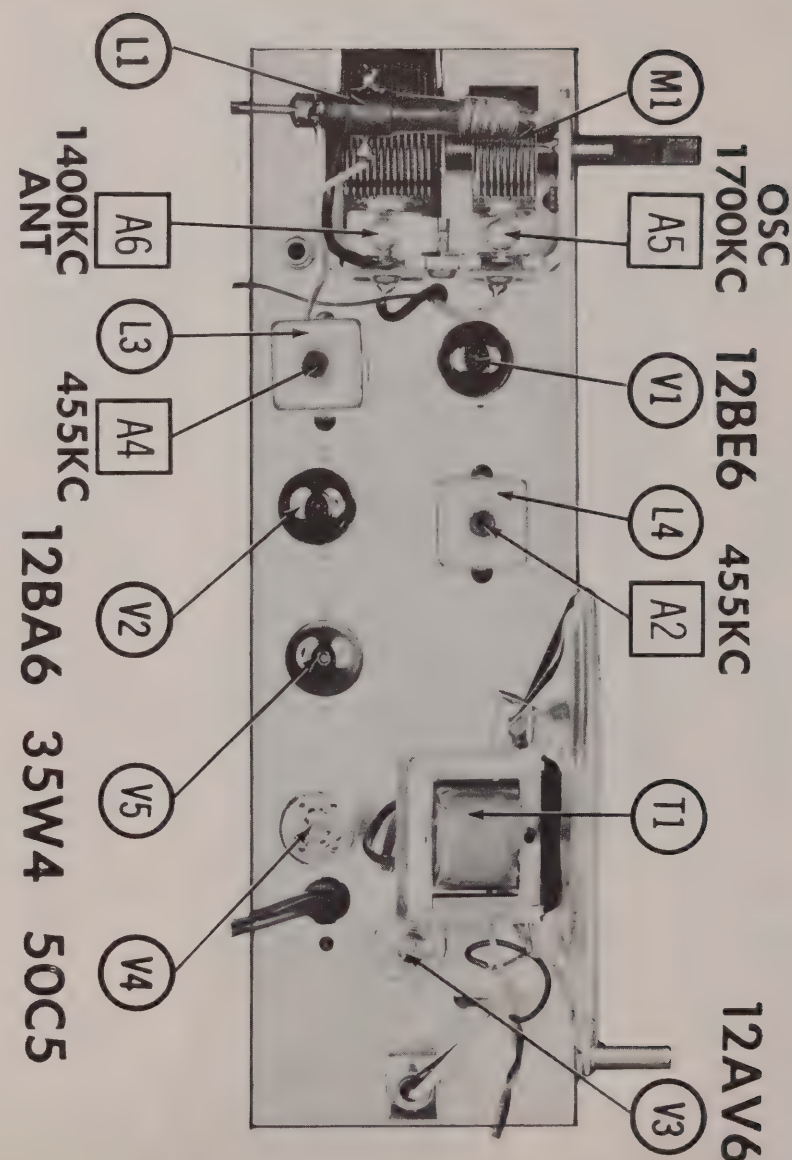
ITEM No.	RATING	REMARKS
R5	10meg	
R6	150Ω	

ITEM No.	RATING	REMARKS
R7	1500Ω 1W	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	PHILLIPS PART No.	REPLACEMENT DATA	
K1	Audio Coupling	10000mmf, 250mmf 500K, 500K		Aerovox	PA-112-3
				Centralab	PC-80
				Cornell-Dubilier	113TM1
				Sprague	T-1

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		PHILLIPS PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1 L2 L3 L4	Ant. Coil Osc. Coil Input IF Output IF	 PR1018 ① PR1019 ②						

①Alternate Part #6455-6
②Alternate Part #6455-16

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	PHILLIPS PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2300Ω	3-4Ω	181264	24S53	A-3025	AU-605	A-3332	24S53	S-12X	

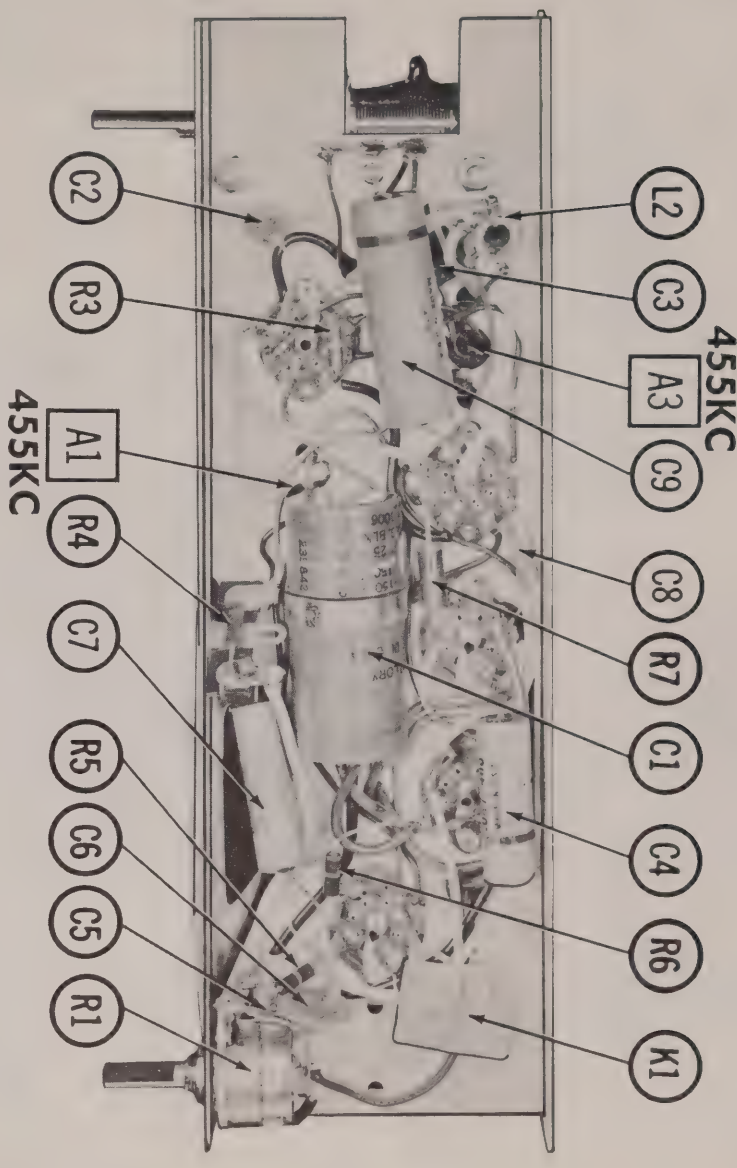
SPEAKER

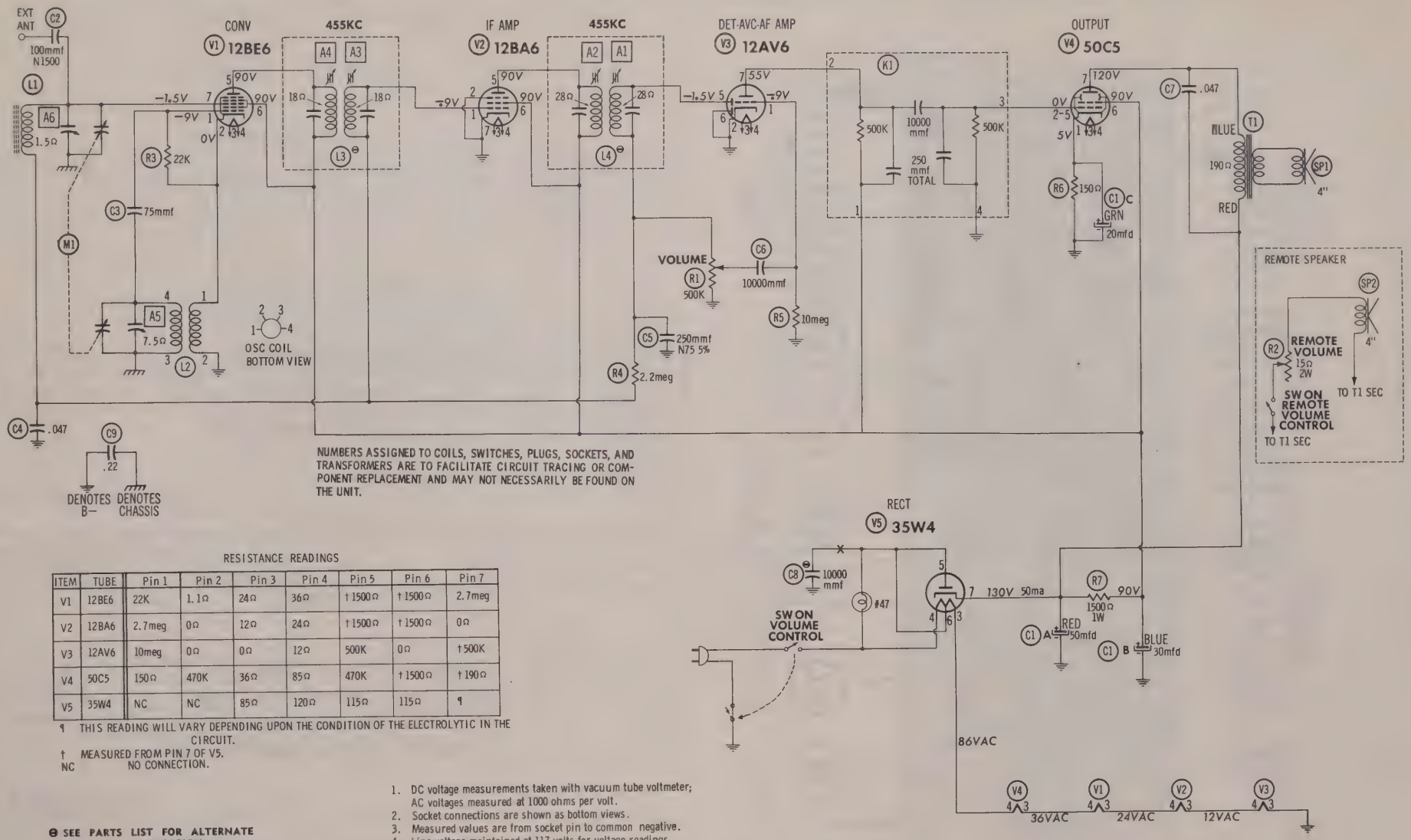
ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	PHILLIPS PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	V4AZ-9	4A07	
SP2	4"	PM	3-4Ω	V4AZ-11	4A07	

MISCELLANEOUS

ITEM No.	PART NAME	PHILLIPS PART No.	NOTES
M1	Tuning Cap.		2 Gang Ant. 32—484mmf, Osc. 30—195mmf

CHASSIS BOTTOM VIEW





NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	22K	1.1Ω	24Ω	36Ω	†1500Ω	†1500Ω	2.7meg
V2	12BA6	2.7meg	0Ω	12Ω	24Ω	†1500Ω	†1500Ω	0Ω
V3	12AV6	10meg	0Ω	0Ω	12Ω	500K	0Ω	†500K
V4	50C5	150Ω	470K	36Ω	85Ω	470K	†1500Ω	†190Ω
V5	35W4	NC	NC	85Ω	120Ω	115Ω	115Ω	¶

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 7 OF V5.
NC NO CONNECTION.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PHILLIPS MODEL R-100

PHOTOFACT* Folder with CIRCUITRACE*

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PONTIAC
MODEL 988978

PONTIAC
MODEL 988978

PONTIAC
MODEL 988978

TRADE NAME	Pontiac Model 988978 (For 1959 Pontiac Automobiles)		
MANUFACTURER	Delco Radio Div., G. M. Corp., Kokomo, Indiana		
TYPE SET	Battery Operated Custom Built Transistorized Automobile-Portable AM Receiver		
POWER SUPPLY	12 Volt Storage Battery (or) 5.2 Volts DC	RATING	1.2 Amp. @ 12.6 Volts DC (Auto.)
TUNING RANGE	535 - 1615KC (Auto)		8MA @ 5.2 Volts DC (No Signal, Min. Vol.) Portable
	535 - 1680KC (Port.)		10MA @ 5.2 Volts DC (Signal, Normal Vol.) Portable

DISASSEMBLY INSTRUCTIONS

1. Remove battery cover. Remove batteries.
2. Remove dial set screw. Remove dial.
3. Turn pointer to high frequency end of dial.
4. Insert #4 Allen wrench between top cover and printed board and unscrew pointer set screw.
5. Remove top cover by spreading case sides and lifting.
6. Remove printed board by spreading antenna side of case.
7. For complete removal, unsolder green antenna lead.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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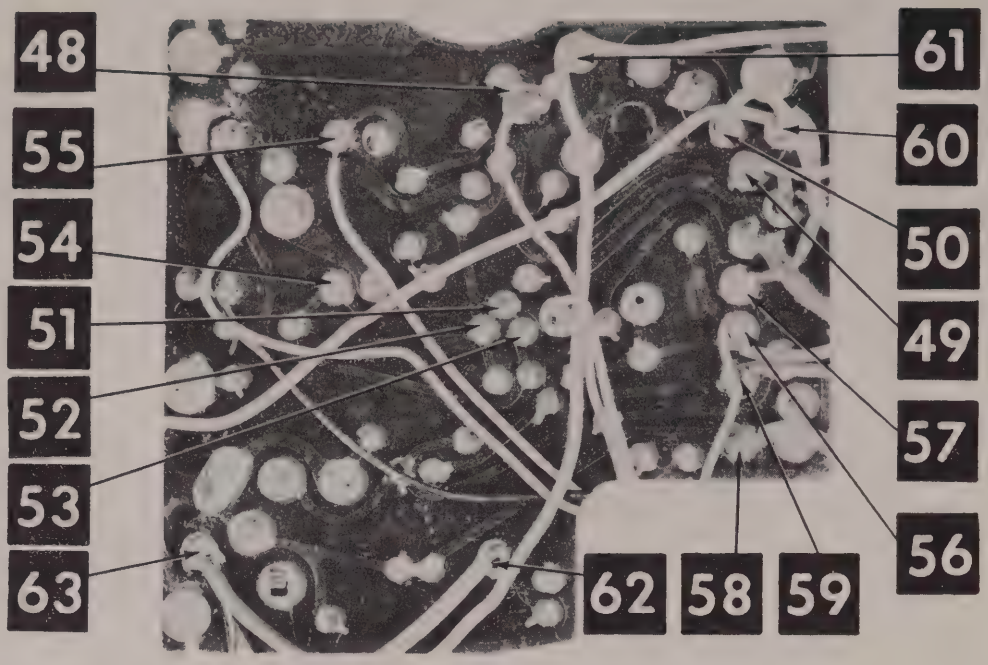

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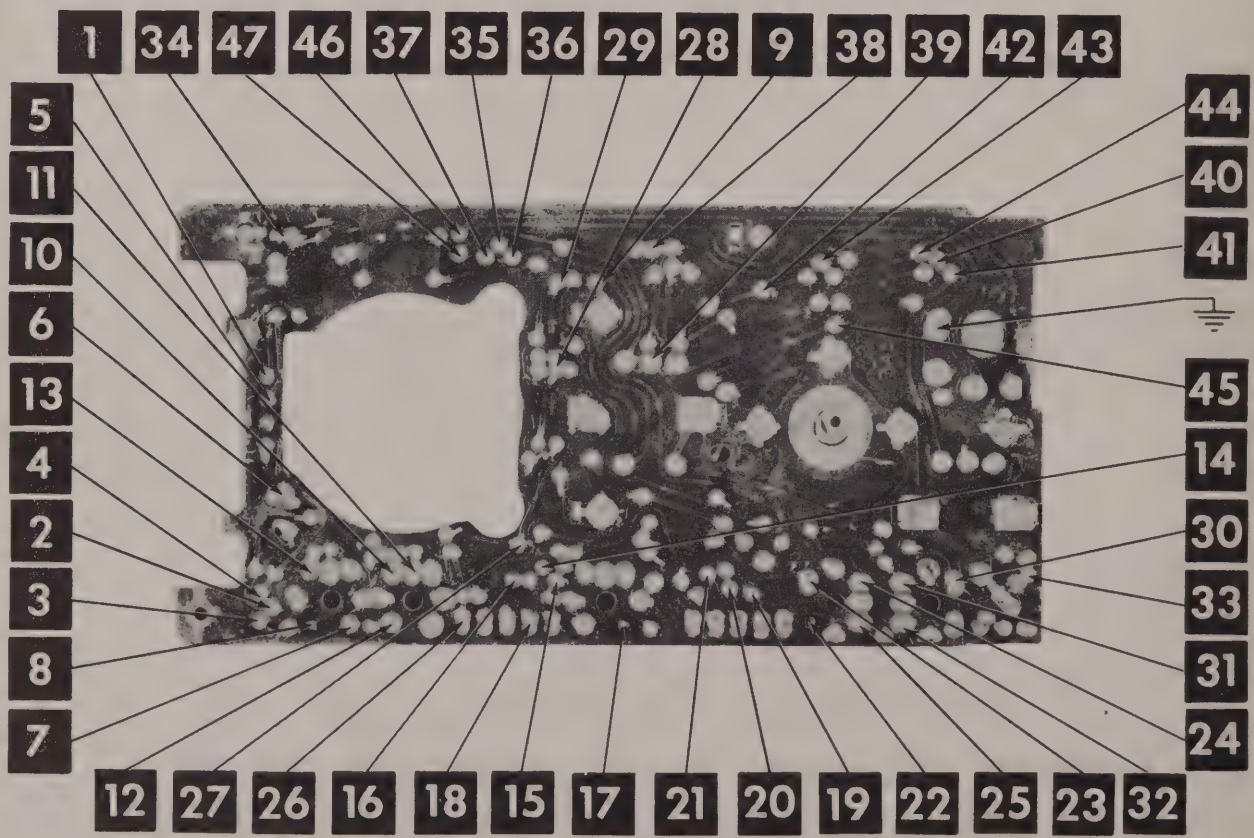
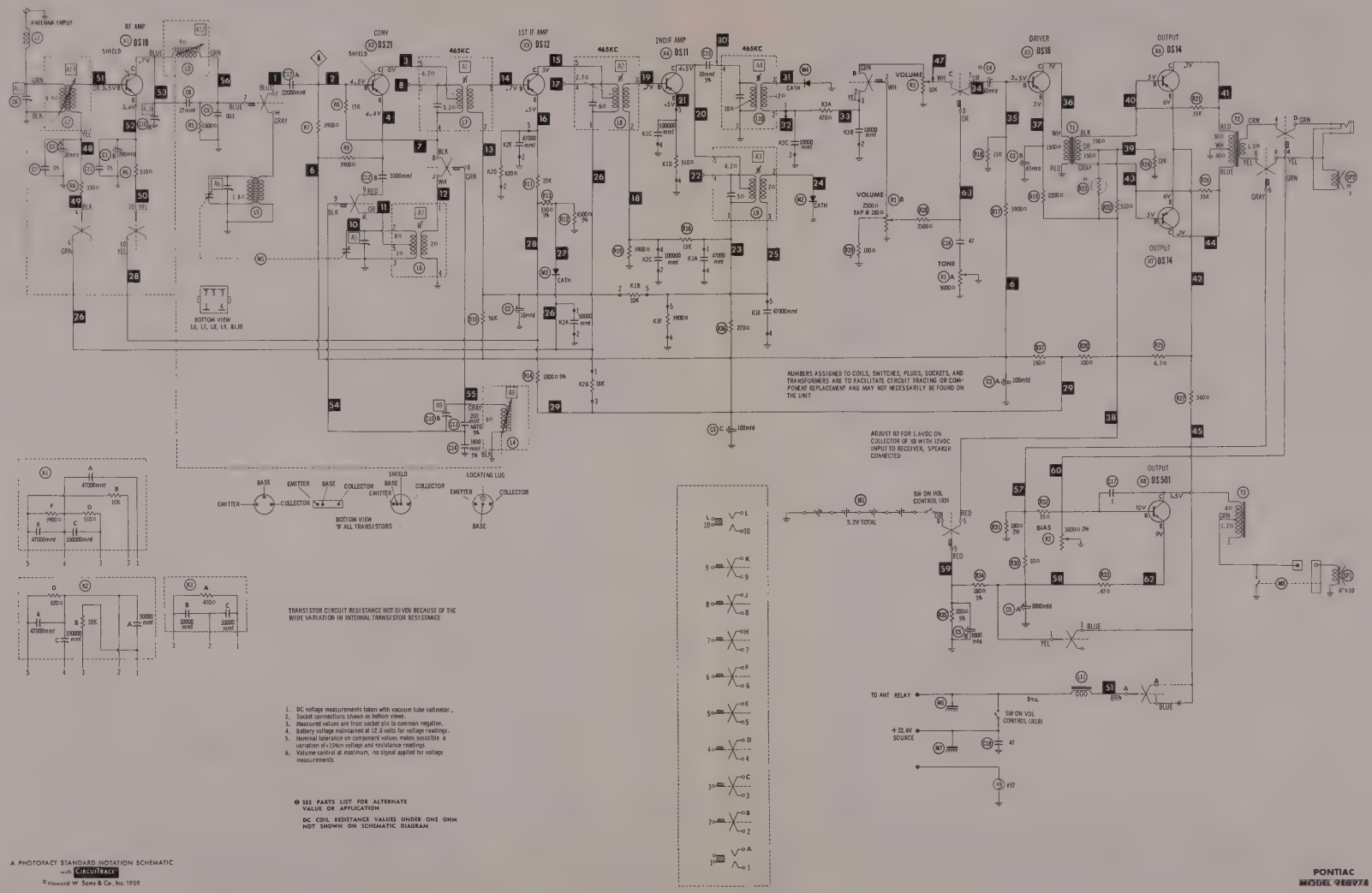
AUTO PRINTED BOARD



A Howard W. Sams CIRCUITRACE* Photo

PORTABLE PRINTED BOARD


ANTENNA INPUT
RF AMP
CONV
1ST IF AMP
2NDIF AMP
DRIVER
OUTPUT
VOLUME
TONE
BOTTOM VIEW
L6, L7, L8, L9, &L10
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT
ADJUST R2 FOR 1.6VDC ON COLLECTOR OF X8 WITH 12VDC INPUT TO RECEIVER, SPEAKER CONNECTED
SW ON VOL CONTROL (R3)
5.2V TOTAL
BIAS
TO ANT RELAY
SW ON VOL CONTROL (R1B)
+12.6V SOURCE
BOTTOM VIEW 'W' ALL TRANSISTORS
LOCATING LUG
TRANSISTOR CIRCUIT RESISTANCE NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE
1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements
● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE

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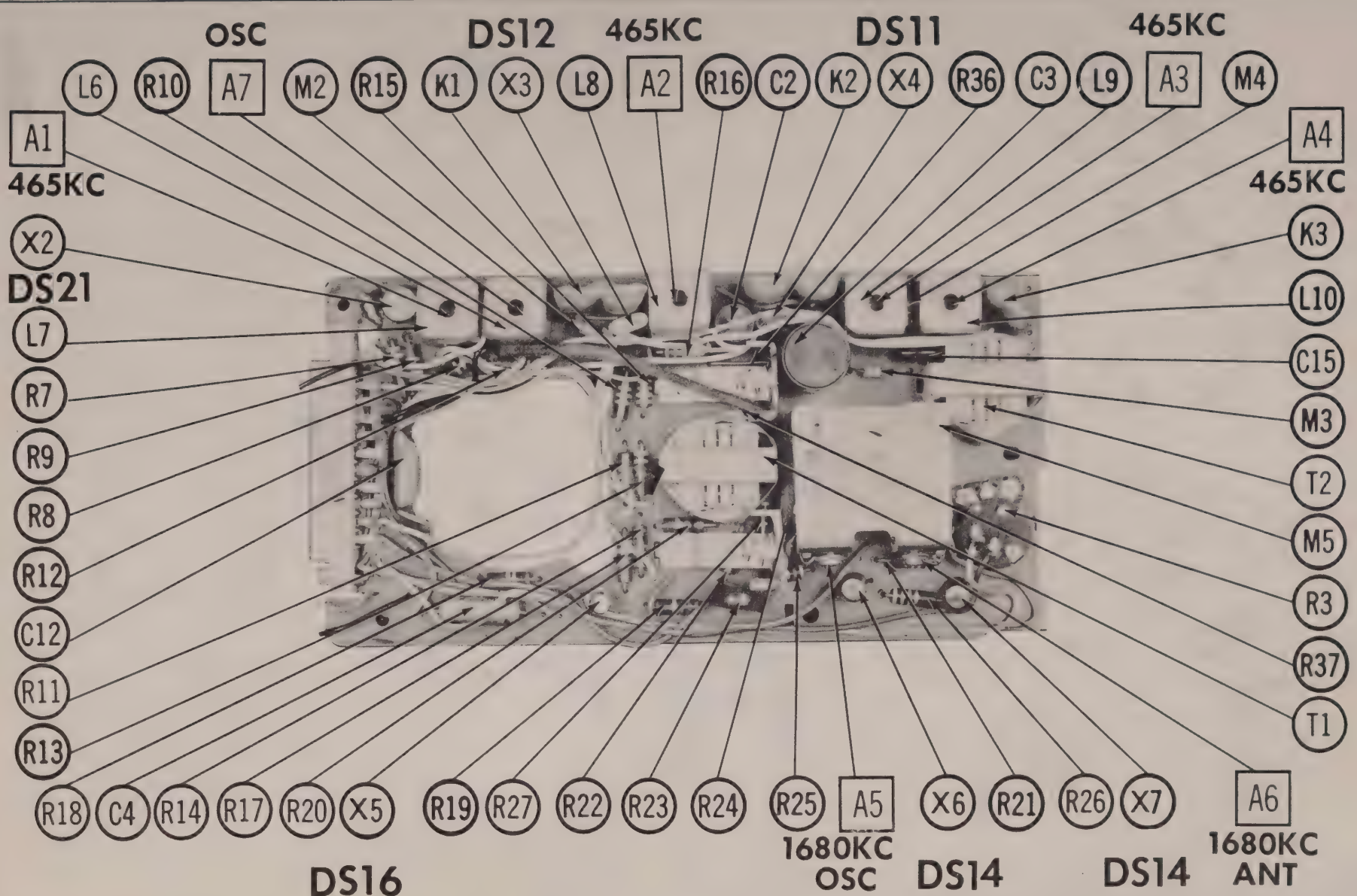
PONTIAC MODEL 21077



PORTABLE PRINTED BOARD

MODEL 988978

PONTIAC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:
- A1 thru A4, A7 ..... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8987 WALSCO #2531
- A5, A6, A8, A10, A11, A12 .... GENERAL CEMENT #5000, 5003, 8276, 8290 WALSCO #2512, 2525
- A9, A13, A14 ..... GENERAL CEMENT #8607, 9291 WALSCO #2520, 2522, 2523, 2524, 2537

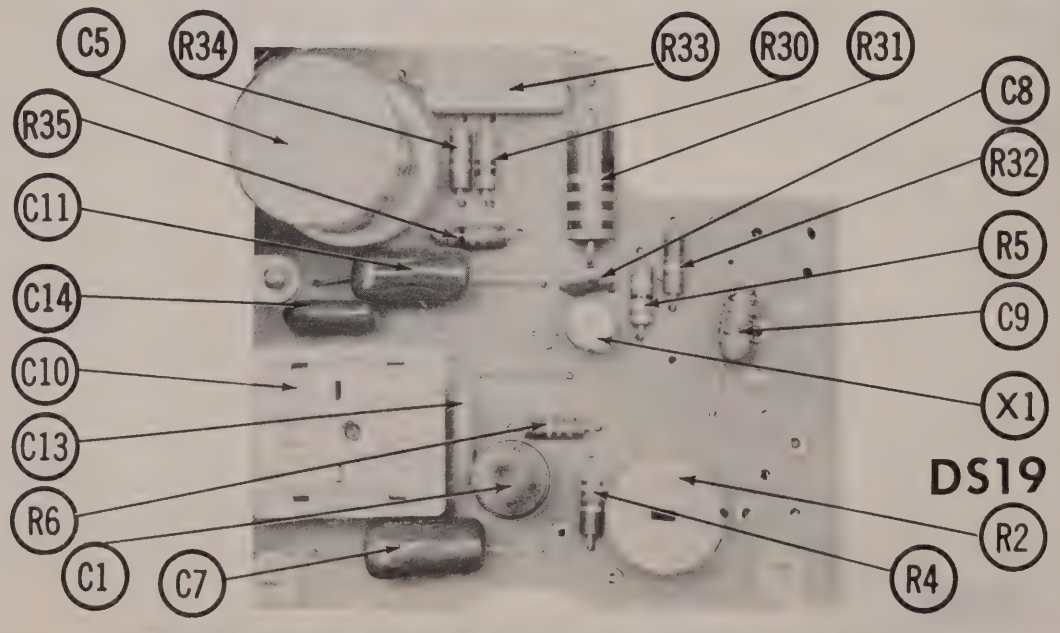
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to Base of Converter. Low side to chassis.	465KC (400∿ Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1680KC	"	"	A5, A6,	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		None. Use noise		Near 600KC	"	A7	Adjust for maximum output.
4.		Loop	1400KC	Tune to 1400KC signal	"	A6	Retouch for maximum output.
	If it is necessary to align the pushbutton tuner, connect the portable to it and procede as follows. Check setting of oscillator core (A8). Rear of core should be 1 5/8" from mounting end of coil form.						
5.	68mmf	High side to antenna receptacle. Low side to chassis.	1615KC	High frequency end stop	Across voice coil	A9, A10, A11	Adjust for maximum output.
6.	"	"	600KC	600KC signal	"	A12, A13	"
7.	"	"	1615KC	1615KC signal	"	A10, A11	"
	With radio installed in car and antenna fully extended, tune in a weak station near 1100KC and adjust A11 for maximum output.						

POINTER ADJUSTMENT

With radio tuned to an 1100KC signal, adjust pointer to coincide with 1100KC on dial.

PUSHBUTTON ADJUSTMENT

1. Pull pushbutton to left and out.
2. Tune manually to desired station.
3. Press pushbutton in firmly.
4. Repeat for remaining pushbuttons.



PRINTED BOARD—AUTO UNIT

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	DS19	RF Amplifier					PNP
X2	DS21	Converter			2N486		PNP
X3	DS12	IF Amplifier					NPN
X4	DS11	IF Amplifier					NPN
X5	DS16	Driver			2N362		PNP
X6	DS14	Output			2N633		PNP } Matched
X7	DS14	Output			2N633		PNP } Pair
X8	DS501	Output					PNP

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	DELCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	20	8	7273794			PET2410			
B	200	8							
C2	10	8	7273798	BCD10010	ECPB408	TT12X10	ML10-15	VL-1127	
C3A	100	8	7274108					VL-3320	
B	65	8							
C	100	8							
C4	10	8	7271255	PWE10010	EC10-10	TT12X10	ML10-15	TE-1114	①
C5A	▲1000	10	7273793	PWH2-75-45				PCLS-2162*	
B	▲1000	16							

① Alternate Part #7273799.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

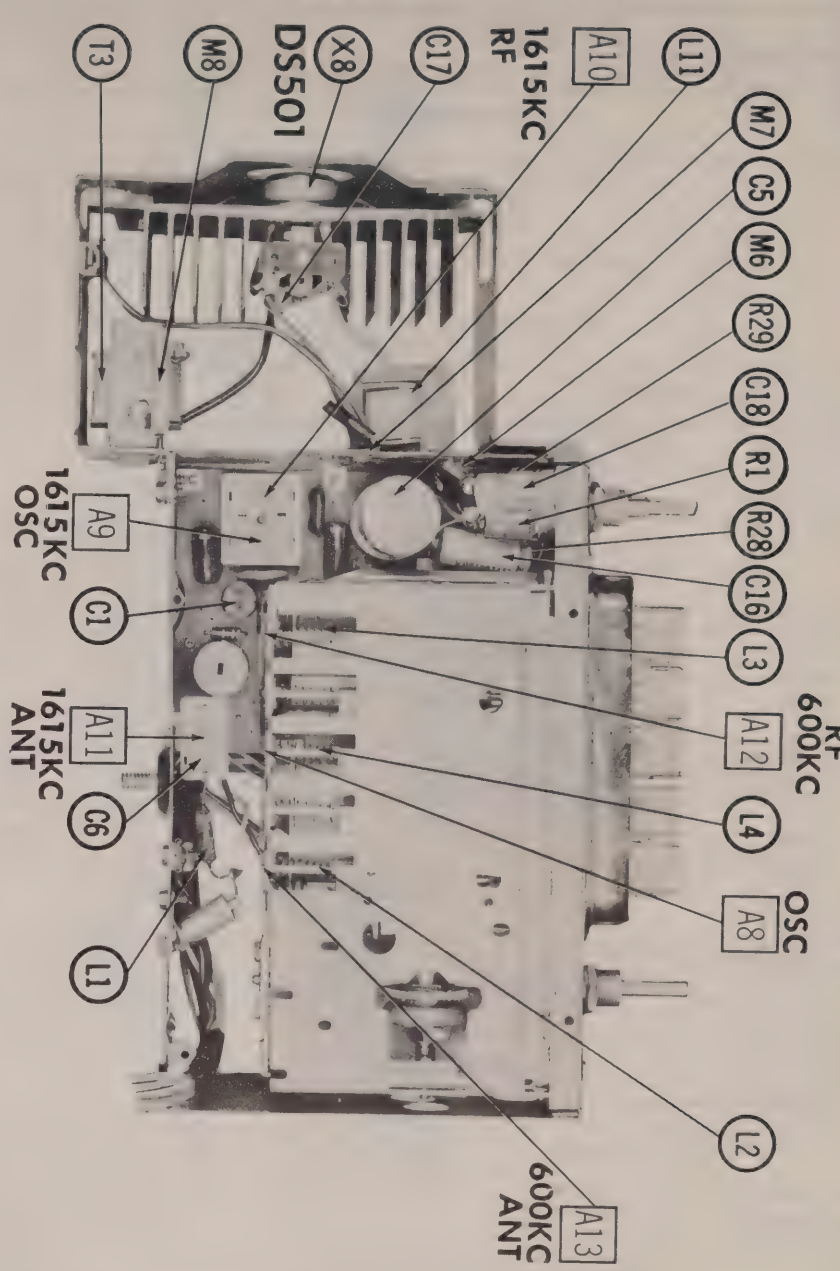
ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C6		#7274218						
C7	.05 50V		P1123S-047	DDA-503	WMF1S47E	1DP-2-503	GTM-115	65P47352
C8	27		DI-27	DD-270	L10T27	CCD-270	CNO-427	5GA-Q27
C9	.001 50V		P1123S-001	DM-102	WMF1D1E	6DP-1-102	GTM-121	65P10253
C10A		#7273797						
B								
C11	.05 50V		P1123S-047	DDA-503	WMF1S47E	1DP-2-503	GTM-115	65P47352
C12A	22000	#7273803	BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-820
B	3300		BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C13	200 N470 5%	#7271299				*		
C14	1800 5%		ADM-19-182		5A5D18	CM-20B-182J		MS-218
C15	10 5%		ADM-15-100	DTZ-10	22A5Q1	CM-20B-100J	MCE215	MS-41
C16	.47 50V		P1123S-47		WMF1P47E	2DP-5-474	GTM-1047	2EP-P50
C17	.1 100V		P1123S-1	DF-104	WMF1P1E	1DP-2-104	GTM-101	65P10452
C18	.47 50V		P1123S-47		WMF1P1E	2DP-5-474	GTM-1047	2EP-P50

Delco Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	DELCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	5000Ω	½	7274024					Tone
B	2500Ω	½						Volume
	200Ω tap							
C	Switch							Off-On
R2	3000Ω	2(WW)	7273796					Bias
R3A	10K	½	7274634					Portable Volume
B	Switch							Portable Off-On

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	330Ω	
R5	1500Ω	
R6	510Ω	
R7	3900Ω	
R8	15K	
R9	3900Ω	
R10	56K	
R11	15K	
R12	4300Ω 5%	
R13	330Ω 5%	
R14	1000Ω 5%	
R15	3900Ω	

ITEM No.	RATING	REMARKS
R16	15K	
R17	3900Ω	
R18	15K	
R19	2200Ω	
R20	100Ω	
R21	33K	
R22	510Ω	
R23		#7270782 ①
R24	12K	
R25	4.7Ω	
R26	33K	
R27	360Ω 5%	

ITEM No.	RATING	REMARKS
R28	3300Ω	
R29	100Ω	
R30	10Ω	
R31	180Ω 2W	
R32	33Ω	
R33	.47Ω	
R34	180Ω 5%	
R35	200Ω 5%	
R36	270Ω	
R37	150Ω	

Delco Part Number.

① Temperature Compensating.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		DELCO PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Antenna Coil	7255738	19-1004	19-1004	BC-565	4610		
L2	Antenna Coil	1221338						
L3	RF Coil	1221138						
L4	Osc. Coil	1221339						
L5	Loopstick	7274005						
L6	Osc. Coil	7273763						
L7	1st IF Trans.	7274341						
L8	2nd IF Trans.	7273760						
L9	3rd IF Primary	7273761						
L10	3rd IF Secondary	7273762						

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ~)	DELCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L11	1.2A	.75Ω	.011 Hy.	7271321						

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	DELCO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.3	1	7273764					①TY-56X	① Use original frame.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	DELCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	150Ω CT	10Ω	7273765	TR-112 ①				TR-112①	TY-50X①	① Use original frame.
T3	9Ω	Tap @ 3-4Ω	7273626							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	DELCO PART No.	QUAM PART No.	
SP1	4" x 10"	PM	3-4Ω	7272752	46A15	① May be used in some versions.
SP2	3"	PM	13-14Ω	7273929		
	3"	PM		7273926 ①		

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	DELCO PART No.	REPLACEMENT DATA
K1	IF Coupling	47000mmf, 47000mmf, 100000mmf, 510Ω, 3900Ω, 10K	7273801	
K2	IF Coupling	47000mmf, 50000mmf, 100000mmf, 820Ω, 18K	7273802	
K3	Diode RF Filter	10000mmf, 10000mmf, 470Ω	7273804	

BATTERIES

ITEM No.	VOLTAGE	DELCO PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.3V			Z ①		E9N ①		DM-9N①	① Four required

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		DELCO PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2		DS18	1N60	1N60	1N295	Detector (Pigtail)
M3		DS18	1N60	1N60	1N295	AVC (Pigtail)
M4		DS18	1N60	1N60	1N295	Overload (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	DELCO PART No.	NOTES
M5	Tuning Cap.	7273835	2 Gang
M6	Spark Plate	7271564	
M7	Spark Plate	7271564	
M8	Switch	7271425	Speaker Interlock
	Printed Board	7273516-D	Auto
	Printed Board	7273459-6	Portable

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	7274023	Tuning (Portable)
Knob	532456	Control (Car)
Knob	7273822	Volume, Off-On (Portable)
Knob	532455	Tone, (Car)
Knob	532707	Dummy (Car)
Pushbutton	7273140	
Pushbutton Ass'y.	1221284	Includes Front Bearing Plate & Slides
Pointer & Hub Ass'y.	7273914	
Case	7274206	Wrap Around (Portable)
Case	7274029	Front Panel (Portable)
Case	7273915	End Plate, Battery Cover
Case	7274616	End Plate, Earphone Jack Cover

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire .....Use BELDEN No. 8885
Bonding Strap .....Use BELDEN No. 8661

PHOTOFACT* Folder

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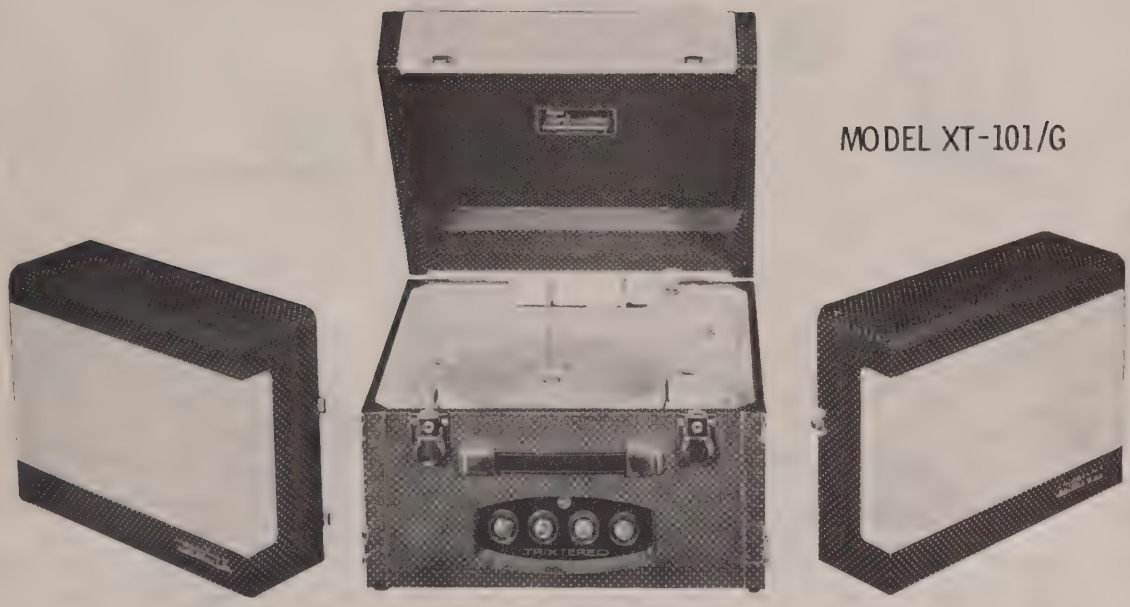
TRIXTEREO MODELS XT-101/B, XT-101/G

TRIXTEREO MODELS
XT-101/B, XT-101/G



MODEL XT-101/G

TRIXTEREO MODELS
XT-101/B, XT-101/G

TRADE NAME	Trixtereo Model XT 101/B, XT 101/G
IMPORTER	Ercona Corp., 16 W. 46th Street, New York 36, N. Y.
MANUFACTURER	The Trix Electrical Co. Ltd., 1-5 Maple Place, Tottenham Court Road, London W. 1, England
TYPE SET	AC Operated 4 Tube Phono Amplifier With 4 Speed Automatic Record Changer
POWERSUPPLY	110-120 Volts AC, 60 Cycles RATING 41 Watts, .42 Amp. @117 Volts AC

FOR SERVICE INFORMATION ON RECORD CHANGER USED IN MODEL XT 101/G - SEE SIMILAR GARRARD RC 121/MKII - PHOTOFACT SET 421 FOLDER 7
FOR SERVICE INFORMATION ON RECORD CHANGER USED IN MODEL XT 101/B - SEE SIMILAR MONARCH UA12 - PHOTOFACT SET 465 FOLDER 6

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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JT401

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE
V1	Right Channel AF Amp. - Left Channel AF Amp.	ECC83
V2	Right Channel AF Amp. - Right Channel Output	ECL82
V3	Left Channel AF Amp. - Left Channel Output	ECL82
V4	Rectifier	EZ80

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	TRIX PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	32	350		PR3-035	C0320	FP376.6	TMT-36	TVL-3772	
B	8	350							
C	8	350							
C2	25	25		SRE25V25	BBR25-25	TT25X25	TD-25-25	TE-1207	①
C3	25	25		SRE25V25	BBR25-25	TT25X25	TD-25-25	TE-1207	①
C4	25	25		SRE25V25	BBR25-25	TT25X25	TD-25-25	TE-1207	
C5	25	25		SRE25V25	BBR25-25	TT25X25	TD-25-25	TE-1207	

① Not used in some versions.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

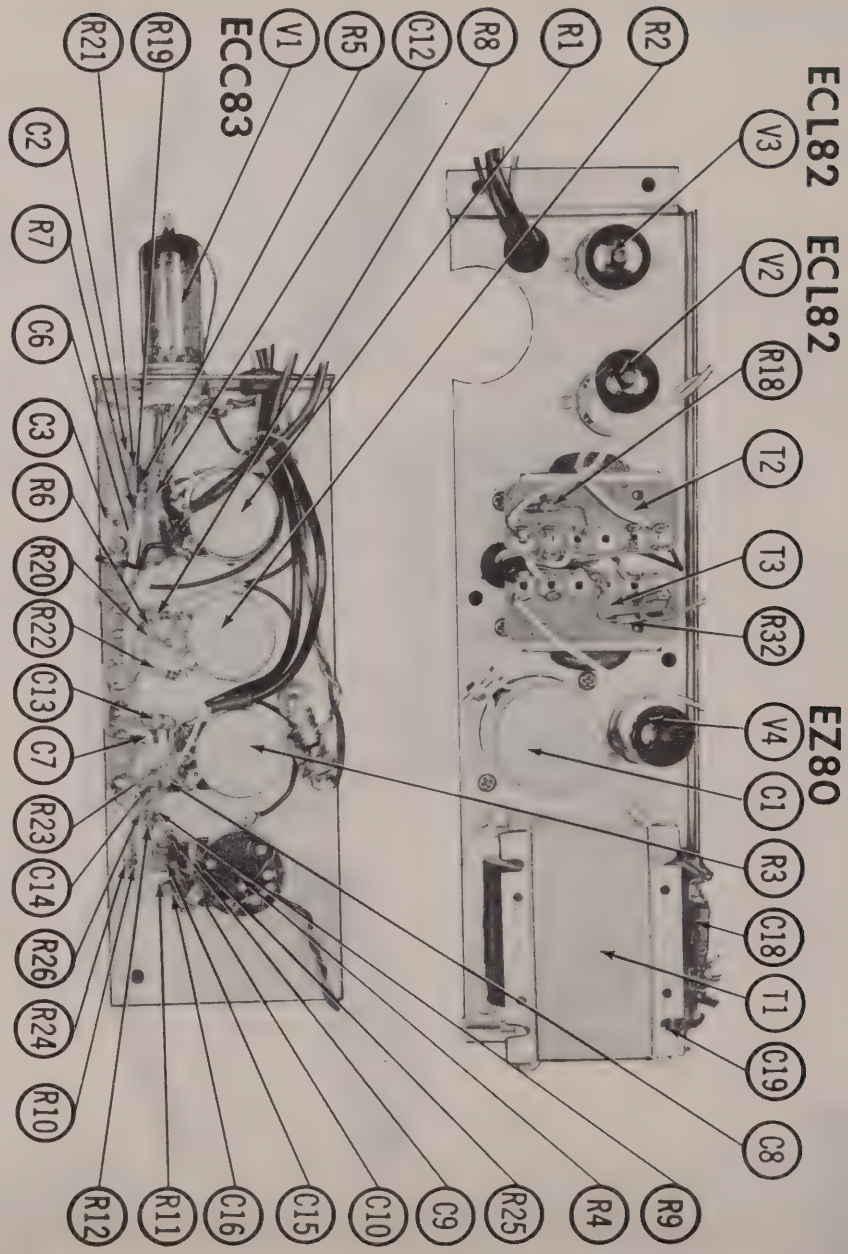
ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C6	.05 400V		P488N-05	DF-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C7	330		SI 300	DD-331	L10T33	CCD-331	UC-5333	5GA-T33
C8	3000		SI 3000	DD-302	BYA10D3	CCD-302	UC-523	5HK-D30
C9	1000		SI 1000	DD-102	BYA10D1M	CCD-102	UC-521	5HK-D10
C10	10000		SI 10000	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C11	.05 400V		P488N-05	DF-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C12	.05 400V		P488N-05	DF-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C13	330		SI 330	DD-331	L10T33	CCD-331	UC-5333	5GA-T33
C14	3000		SI 3000	DD-302	BYA10D33	CCD-302	UC-523	5HK-D30
C15	1000		SI 1000	DD-102	BYA10D1M	CCD-102	UC-521	5HK-D10
C16	10000		SI 10000	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C17	.05 400V		P488N-05	DF-503	CUBS5	4DP-3-503	GEM-415	4TM-S5
C18	5000		SI 5000	DF-502	BYA10D5	CCD-502	UC-525	5HK-D50
C19	5000		SI 5000	DF-502	BYA10D5	CCD-502	UC-525	5HK-D50

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	TRIX PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1meg	½	428 1MΩ	B-70	AD47-1meg-Z	Q11-137	■ UE3913	Volume, Left Channel
B	1meg	½		SR-70	Not Req.	M13-137		Volume, Right Channel
C	Shaft			Not Req.	FS-3	Not Req.		
R2A	100K	½	428 100KΩ	B-40	A47-100K-S	Q11-128	U41	Balance
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	1meg	½	428 1MΩ	B-70	AD47-1meg-Z	Q13-137	■ UE3913	Treble, Left Channel
B	1meg	½		SR-70	Not Req.	M13-137		Treble, Right Channel
C	Shaft			Not Req.	FS-3	Not Req.		
R4A	1meg	½	418 1MΩ	B-70	AD47-1meg-Z	Q13-137	▲ UE4053-S	Bass, Left Channel
B	1meg	½		SR-70	Not Req.	M13-137		Bass, Right Channel
C	Shaft			Not Req.	FS-3	Not Req.		
D	Switch			KR-2	SWE-20	76-2		Power Off-On

■ "STA-LOC" equivalent: FA16A, RU16A, CS3500.
▲ "STA-LOC" equivalent: FA16A, RU16A, CS3500, US42.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R5	100K	
R6	47K	
R7	2200Ω	
R8	10K	
R9	100K	
R10	10K	
R11	220K	
R12	100K	
R13	100K	
R14	2200Ω	
R15	470K	

ITEM No.	RATING	REMARKS
R16	100Ω	
R17	390Ω	
R18	10K	
R19	100K	
R20	47K	
R21	2200Ω	
R22	10K	
R23	100K	
R24	10K	
R25	220K	
R26	100K	

ITEM No.	RATING	REMARKS
R27	100K	
R28	2200Ω	
R29	470K	
R30	100Ω	
R31	390Ω	
R32	10K	
R33	10K	
R34	4700Ω 1W	
R35	220Ω 5% 5W	

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1		TRIX PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	240V Tap at 190V, 150V, 117V @ .42A	430 VCT @ .060A		G-7387						
	SEC. 2	SEC. 4	SEC. 5							
	6.3V @ 2.7A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	TRIX PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5600Ω	3-4Ω	G-7352	24S51	A-2930	AU-601	A-3877	24S51	S-3X	
T3	5600Ω	3-4Ω	G-7352	24S51	A-2930	AU-601	A-3877	24S51	S-3X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	TRIX PART No.	QUAM PART No.	
SP1	4"x 7"	PM	3-4Ω		46A15	
SP2	4"x 7"	PM	3-4Ω		46A15	

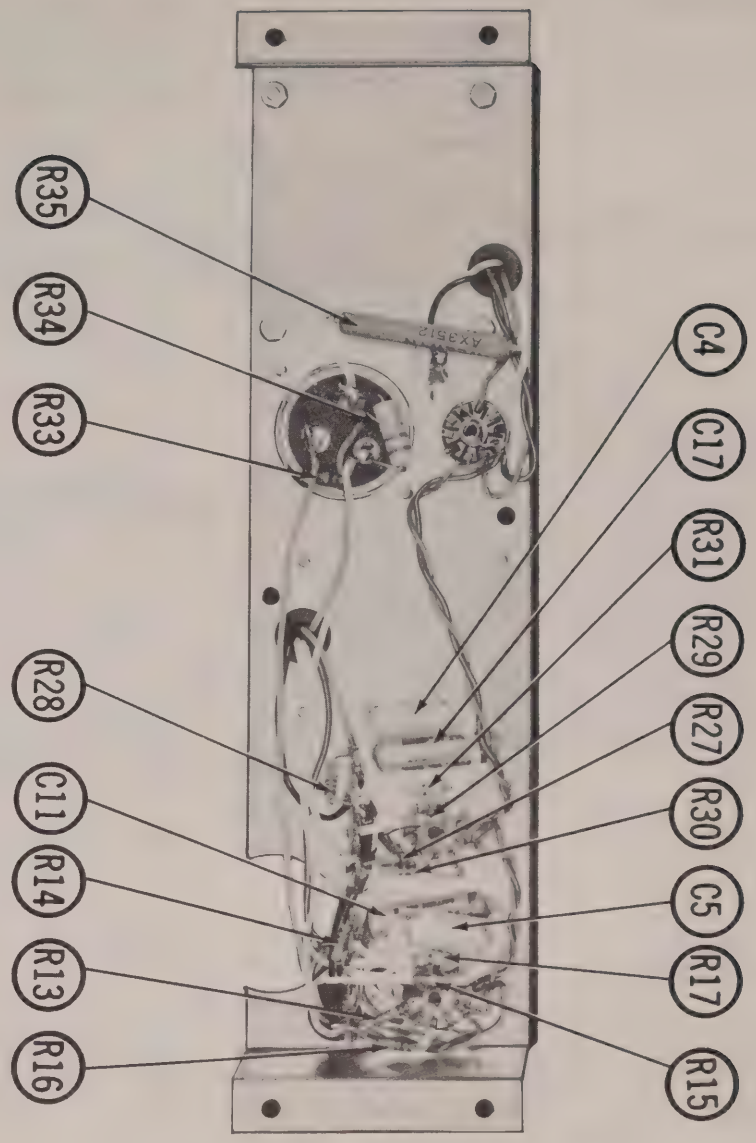
PHONO CARTRIDGE

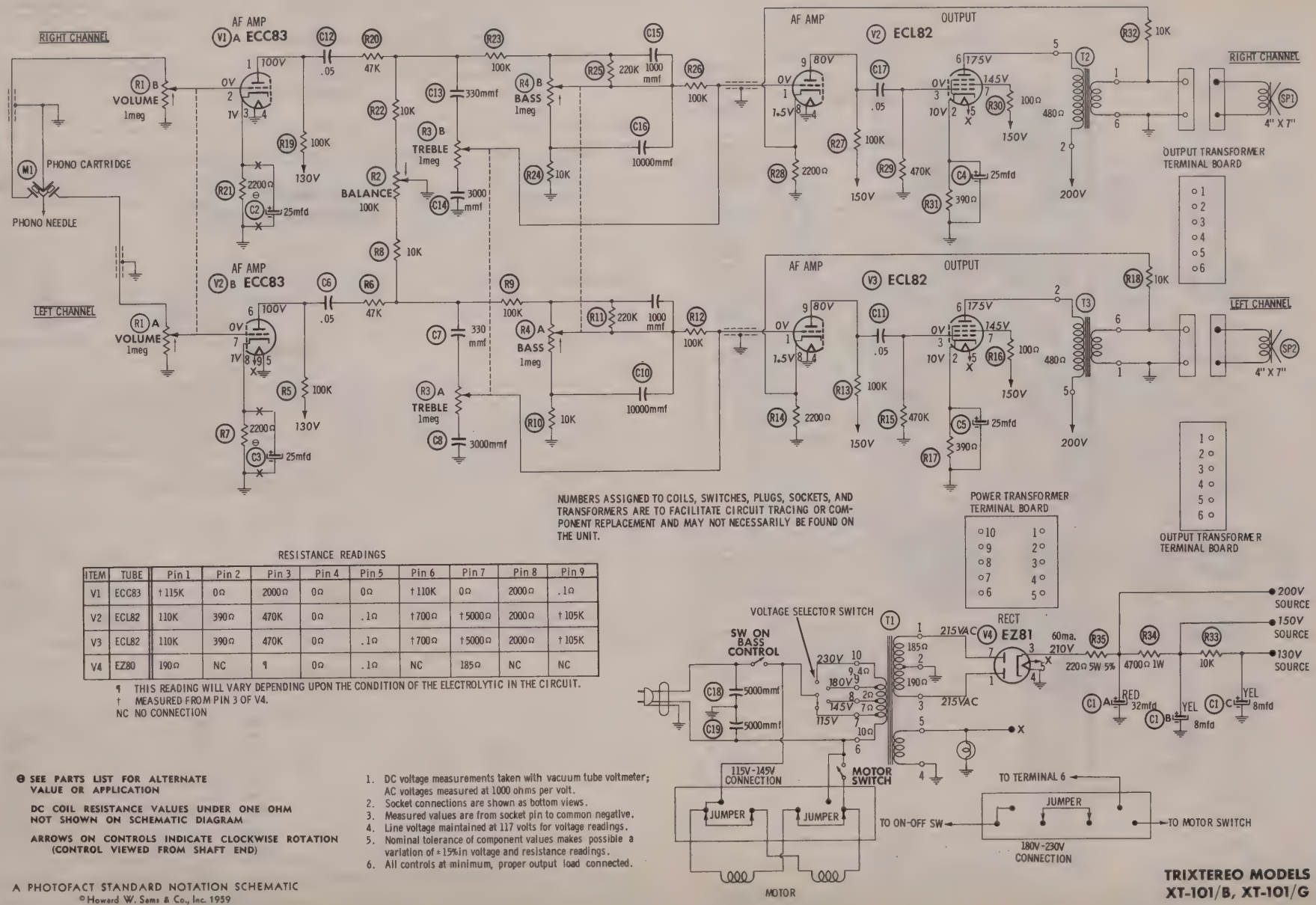
ITEM No.	REPLACEMENT DATA								
	TRIX PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		SONOTONE PART No.	
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE
M1									

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

CHASSIS BOTTOM VIEW





RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC83	†115K	0Ω	2000Ω	0Ω	0Ω	†110K	0Ω	2000Ω	.1Ω
V2	ECL82	110K	390Ω	470K	0Ω	.1Ω	†700Ω	†5000Ω	2000Ω	†105K
V3	ECL82	110K	390Ω	470K	0Ω	.1Ω	†700Ω	†5000Ω	2000Ω	†105K
V4	EZ80	190Ω	NC	¶	0Ω	.1Ω	NC	185Ω	NC	NC

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 3 OF V4.
NC NO CONNECTION

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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TRIXTEREO MODELS XT-101/B, XT-101/G

PHOTOFACT* Folder

EIA MEMBER

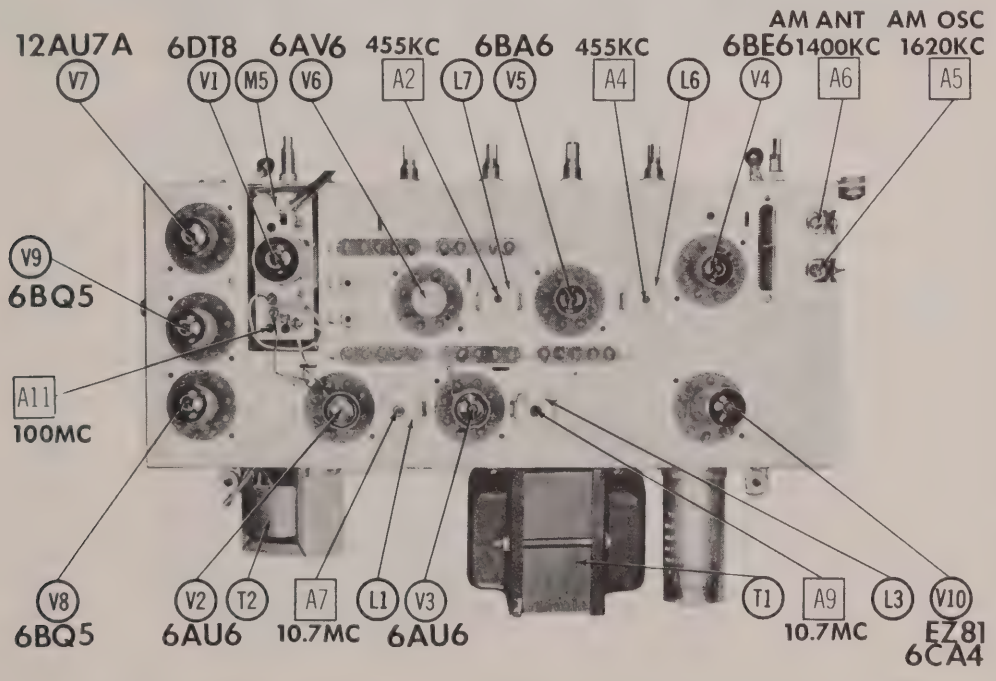
TRUETONE MODELS DC5992, DC5994

TRUETONE MODELS
DC5992, DC5994

MODEL DC5994

TRADE NAME	Truetone Models DC5992, DC5994	
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City 8, Missouri	
TYPE SET	AC Operated 10 Tube FM-AM Receiver with 4 Speed Automatic Record Changer	
POWER SUPPLY	105-125 Volts AC, 60 Cycles	RATING 86 Watts, .85 Amp. @ 117 Volts AC (FM)
TUNING RANGE-BROADCAST	540-1620KC	FREQ. MOD. 88-108MC

FOR SERVICE INFORMATION ON RECORD CHANGER - SEE SIMILAR V-M 959 - PHOTOFACT SET 396 FOLDER 13.



HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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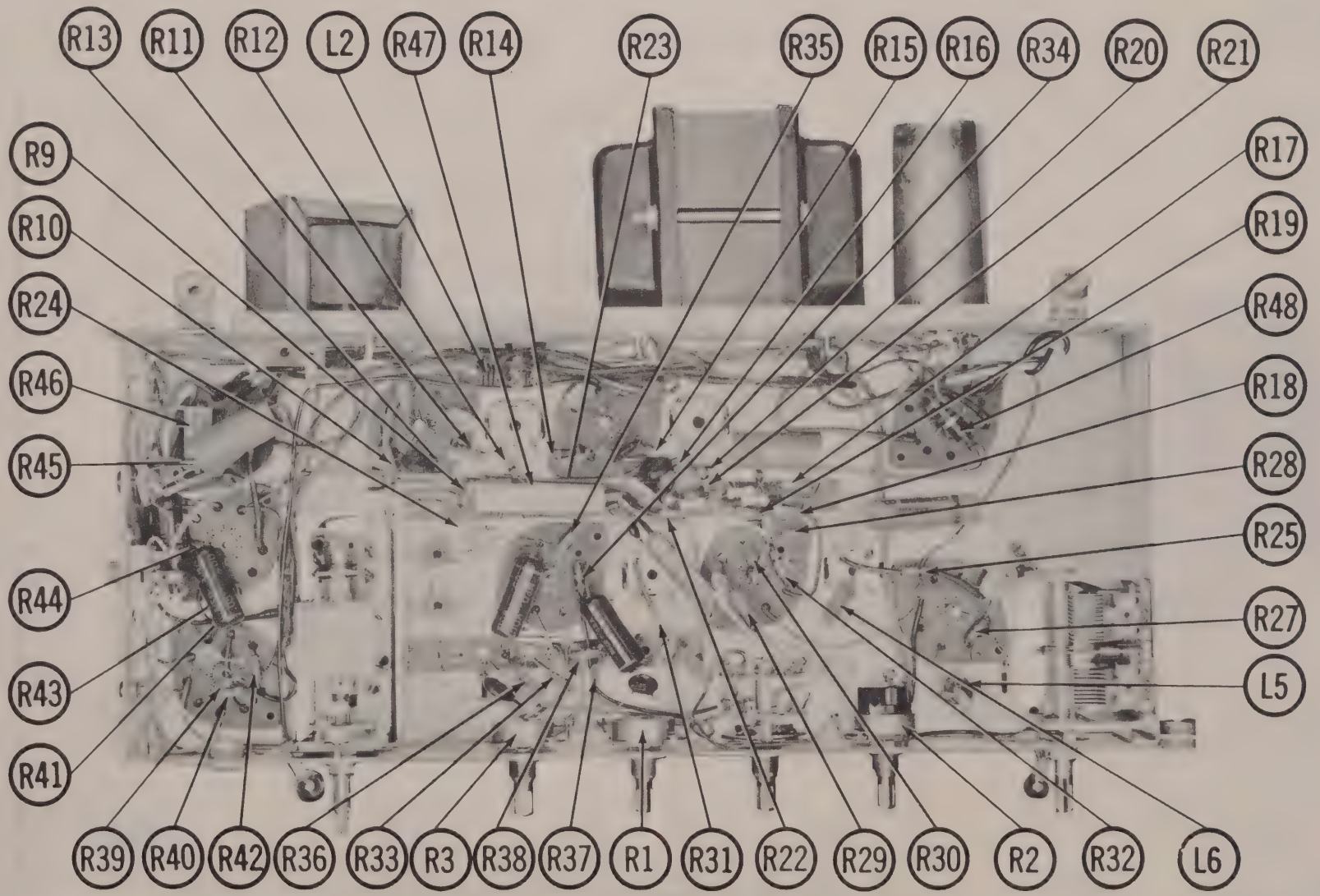
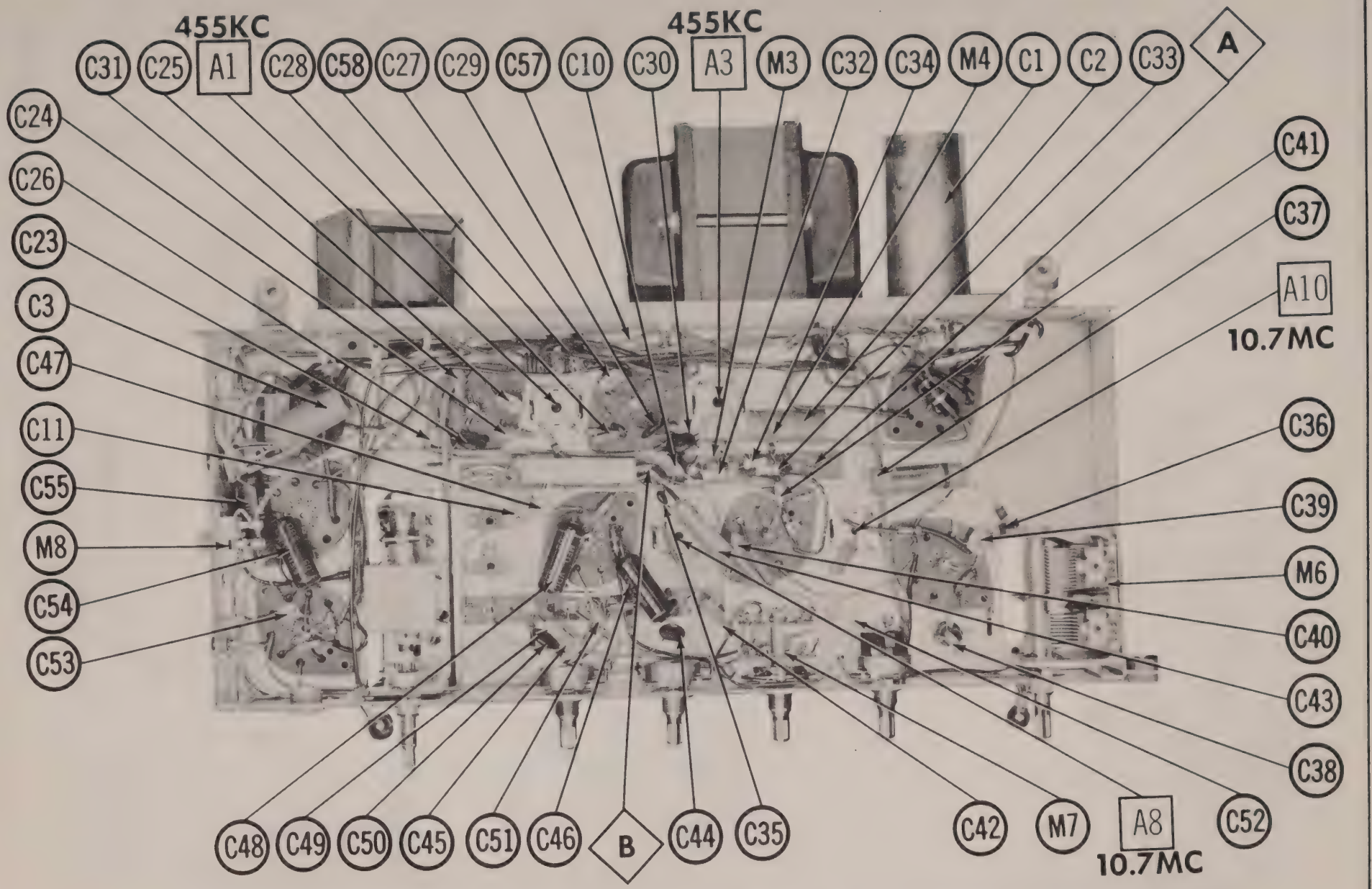
JM230

SET 467 FOLDER 17



CHASSIS BOTTOM VIEW - RESISTOR & INDUCTOR IDENT.



CHASSIS BOTTOM VIEW - CAPACITOR, MISC, & ALIGNMENT IDENT.

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Loudness control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:
A1 thru A4 ....GENERAL CEMENT #8282, 8606, 8606L, 9091
WALSCO #2526, 2541, 2543, 2544
A5, A6 ..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A7 thru A11 ....GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to pin 7 (grid) of AM Converter. Low side to chassis.	455KC (400∿ Mod)	AM	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1620KC	"	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC		1400KC Signal	"	A6	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.005mfd	High side to pin 1 (grid) of 1st FM IF Amp. Low side to chassis.	10.7MC (Unmod)	FM	Low Freq. end of dial.	DC probe to point Ⓐ. Common to chassis.	A7, A8, A9	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe to point Ⓑ. Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.005mfd	High side to pin 1 (grid) of 1st FM IF Amp. Low side to chassis.	10.7MC (450KC Swp)	FM	Low Freq. end of dial	Vert. Amp. to point Ⓐ. Low side to chassis.	A7, A8, A9	Disconnect stabilizing capacitor (C2). Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown.
5.	"	"	"	"	"	Vert. Amp. to point Ⓑ. Low side to chassis.	A10	Reconnect C2. Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	Two 120Ω Carbon Resistors	Across FM antenna terminals with 120Ω in each lead.	100MC (Unmod)	FM	100MC signal	DC probe to point Ⓐ. Common to chassis.	All	Adjust for maximum output while rocking tuning gang.

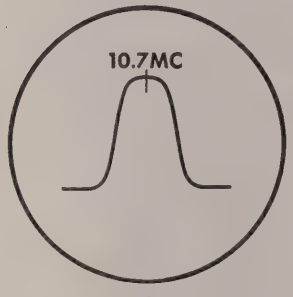


FIG. 1

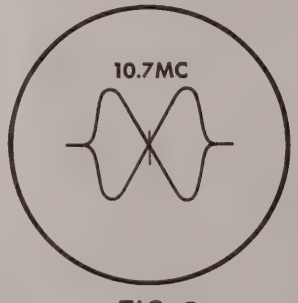
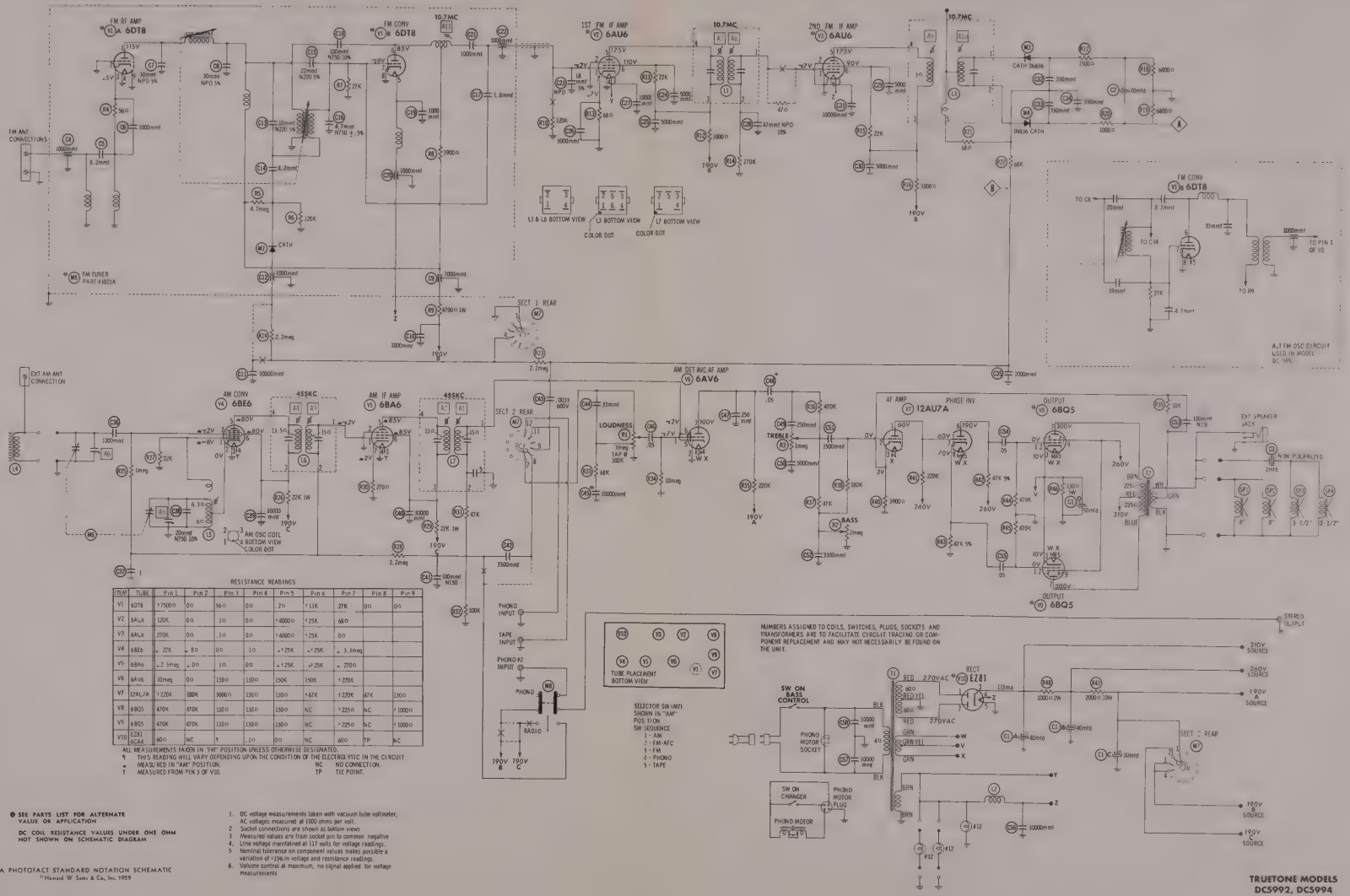


FIG. 2



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6DT8	¶7500Ω	0Ω	56Ω	0Ω	2Ω	¶11K	27K	0Ω	0Ω
V2	6AU6	120K	0Ω	1Ω	0Ω	¶4000Ω	¶25K	68Ω		
V3	6AU6	270K	0Ω	1Ω	0Ω	¶4000Ω	¶25K	0Ω		
V4	6BE6	▲ 22K	▲ 8Ω	0Ω	1Ω	▲¶25K	▲¶25K	▲ 3.3meg		
V5	6BA6	▲ 2.3meg	▲ 0Ω	1Ω	0Ω	▲¶25K	▲¶25K	▲ 270Ω		
V6	6AV6	10meg	0Ω	130Ω	130Ω	150K	150K	¶220K		
V7	12AU7A	¶220K	180K	3000Ω	130Ω	130Ω	¶47K	¶220K	47K	130Ω
V8	6BQ5	470K	470K	130Ω	130Ω	130Ω	NC	¶225Ω	NC	¶1000Ω
V9	6BQ5	470K	470K	130Ω	130Ω	130Ω	NC	¶225Ω	NC	¶1000Ω
V10	EZ81 6CA4	90Ω	NC	1Ω	.1Ω	0Ω	NC	60Ω	TP	NC

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT
▲ MEASURED IN "AM" POSITION.
NC NO CONNECTION.
¶ MEASURED FROM PIN 3 OF V10.
TP TIE POINT.

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±5% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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TRUETONE MODELS DC5992, DC5994

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	FM RF Amp. -FM Conv.	6DT8 ①	V6	AM Det. -AVC-AF Amp.	6AV6
V2	1st FM IF Amp.	6AU6 ②	V7	AF Amp. -Phase Inv.	12AU7A
V3	2nd FM IF Amp.	6AU6 ②	V8	Output	6BQ5 ③
V4	AM Converter	6BE6	V9	Output	6BQ5 ③
V5	AM IF Amp.	6BA6	V10	Rectifier	EZ81/6CA4

① 6AQ8/ECC85 used with FM Tuner #1023. ② 6CB6 used with FM Tuner #1023
③ EL84 alternate type.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▪40	350	1032	AFH4-04-50	C0350	FP431.3	TMT-40	TVL-4622	
B	▪40	350			BR505	TC65	TD-50-50	TVA-1308	
C	▲30	350							
D	50	50							
C2	10	25	916	PRS25V10	BBR10-25	TC22	TD-10-25	TVA-1204	
C3	2	50NP	830A	NP-PRS50-VNP2	BBR4-150 †	TCN502		TVAS-1301.1*	

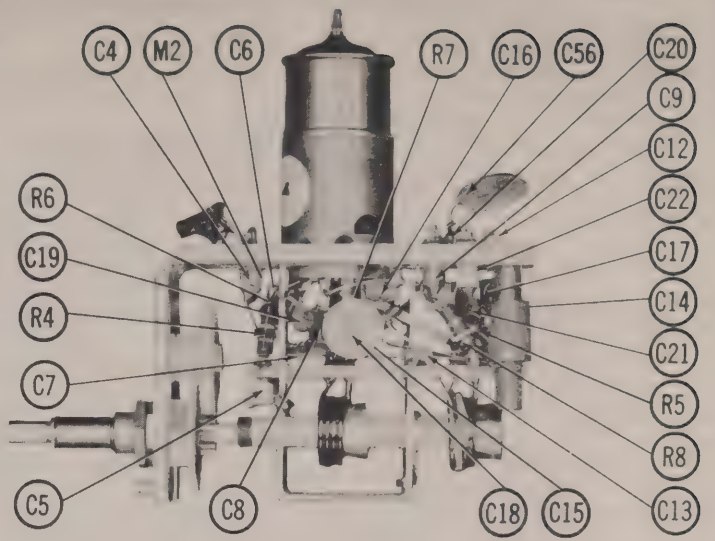
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
† Use 2 units. Connect negative terminals together. Connect positive terminals into circuit the same as the original non-polarized unit.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	RATING TOL	TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C4	1000				EF-001	MFT-1000			503C-D1	
C5	8.2				DI-8.2	MD-8R2	C10V82C			
C6	1000			832	BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C7	30		NPO 5%			TCZ-30	C10Q3C		5TCC-Q3S 10% *	
C8	30		NPO 5%			TCZ-30	C10Q3C		5TCC-Q3S 10% *	
C9	1000				EF-001	MFT-1000			503C-D1	
C10	10000			819B	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C11	10000			819B	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C12	1000				EF-001	MFT-1000			503C-D1	
C13	10		N220 5%							
C14	8.2				DI-8.2	MD-8R2	C10V82C			
C15	22		N220 5%							
C16	4.7		N750 ± 5%			DTN-4R7	C10V47U	CN7-547		
C17	1.8								5TCCB-V18S *	
C18	100		N750 10%		N750-D1 100	DTN-100	C10T1U	CN7-310	5TCU-T1S 10% *	
C19	1000			832	BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C20	1000				EF-001	MFT-1000			503C-D1	
C21	1000			832	BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C22	1000				EF-001	MFT-1000			503C-D1	
C23	18		NPO 5%	846A		TCZ-18	C10Q18C	CNO-418	5TCC-Q18S 5% *	
C24	5000			906	BPD-005	DD-502	BYA10D5	B-250	5HK-D5	
C25	5000			906	BPD-005	DD-502	BYA10D5	B-250	5HK-D5	
C26	5000			906	BPD-005	DD-502	BYA10D5	B-250	5HK-D5	
C27	10000			819B	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C28	47		NPO 10%	843	NPO-D1 47	DTZ-47	C10Q47C	CNO-447	5TCU-Q47S 10% *	
C29	5000			906	BPD-005	DD-502	BYA10D5	B-250	5HK-D5	
C30	5000			906	BPD-005	DD-502	BYA10D5	B-250	5HK-D5	
C31	10000			819B	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C32	330			839	SI 330	D6-331	L10T33	UC-5333	5GA-T33	
C33	330			839	SI 330	D6-331	L10T33	UC-5333	5GA-T33	
C34	330			839	SI 330	D6-331	L10T33	UC-5333	5GA-T33	
C35	1000			832	BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C36	1000			832	BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C37	.1	200		804	P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C38	20		N750 10%	845	N750-D1 20	TCN-20	C10Q2U	CN7-422	5TCU-Q2S 10% *	
C39	10000			819B	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C40	10000			819B	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C41	100		N150	826						

FM TUNER



CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	RATING TOL	TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C42	3300			910	BPD-0033	DD-332	BYA10D33	B-233	5HK-D33	
C43	.0033	600		917	P688N-0033	D6-332	CUB6D33	GEM-6233	6TM-D33	
C44	33			908	DI-33	DD-330	L10Q33	UC-5433	5GA-Q33	
C45	10000			819B	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	①
C46	.05	400		828A	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C47	250			817	DI-250	DD-251	L10T25	UC-5325	5GA-T25	
C48	.05	400		828A	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C49	250			817	DI-250	DD-251	L10T25	UC-5325	5GA-T25	
C50	5000			906	BPD-005	DD-502	BYA10D5	B-250	5HK-D5	
C51	1500			821	BPD-0015	DD-152	BYA10D15	B-215	5HK-D15	
C52	3300			910	BPD-0033	DD-332	BYA10D33	B-233	5HK-D33	
C53	100		N150	826						
C54	.05	400		828A	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C55	.05	400		828A	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C56	10000			819B	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C57	10000			911	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C58	10000			911	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
① Some versions may use 1000mmf in this application (Part #832).

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	TRUETONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	3meg	½	401F	BT-8517	A47F3-3meg		UT-461	Loudness, Tap @ 300K
B	Shaft			Not Req.	KSS-3		Not Req.	
R2A	2meg	½	423				PP26A	Bass
B	Switch						Not Req.	Push-Pull Off-On
R3A	1meg	½	421	B-69	A47-1meg-S	Q11-137	U54	Treble
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

PARTS LIST & DESCRIPTION (continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	TRUETONE PART No.	NOTES
R4	56Ω			
R5	4.7meg			
R6	120K			
R7	27K			
R8	3900Ω			
R9	4700Ω	1	646	
R10	120K			Note 1
R11	22K		517	
R12	1000Ω		539A	
R13	68Ω		551A	
R14	270K		529A	
R15	22K		517	
R16	1000Ω		539A	
R17	1500Ω		559	
R18	6800Ω		549A	
R19	6800Ω		549A	
R20	1000Ω		539A	
R21	68Ω		551A	
R22	68K		547A	
R23	2.2meg		615	
R24	2.2meg		615	
R25	1meg		516	
R26	22K	1	647	

ITEM No.	RATING OHMS	RATING WATT	TRUETONE PART No.	NOTES
R27	22K		517	
R28	2.2meg		615	
R29	22K	1	647	
R30	270Ω		546	
R31	47K		523A	
R32	100K		507A	
R33	68K		547A	
R34	10meg		530	
R35	220K		511A	
R36	470K		502A	
R37	47K		523A	
R38	180K		508	
R39	10K		522	
R40	3900Ω		556A	
R41	220K		511A	
R42	47K 5%		523B	
R43	47K 5%		523B	
R44	470K		502A	
R45	470K		502A	
R46	130Ω	5	643	
R47	2000Ω	10	642	
R48	1000Ω	2	648	

Note 1. Not used in some versions.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA TRUETONE PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	1st FM IF Trans.	1413	16-3487	16-3487	BC-254	1463		
L2	Fil. Choke							1.3uh
L3	Ratio Detector	1414	17-3498	17-3498	FM-255	1465		
L4	Loopstick	1512E						
L5	AM Osc. Coil	1401A			BC-393			
L6	1st AM IF Trans.	1405	16-6758	16-6758	BC-352	12-C1	RF-1	
L7	2nd AM IF Trans.	1406A	16-6770	16-6770	BC-355	12-C6		

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA TRUETONE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .85A	540VCT @ .115A	6.3VCT @ 1.5A	1108						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @ 3.1A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA TRUETONE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	6400Ω CT	3-4Ω CT	1212		A-2905 ①	AU-606	A-3870		S-55X	① Drill new mounting hole.

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA TRUETONE PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	8"	PM	4-5Ω	2640	8A31	
SP2	8"	PM	4-5Ω	2640A	8A31	
SP3	3½"	PM	9-10Ω	2641	4AQ7	
SP4	3½"	PM	9-10Ω	2641	4AQ7	

PHONO CARTRIDGE

ITEM No.	TRUETONE PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	JENSEN PART No. CARTRIDGE	JENSEN PART No. NEEDLE	SONOTONE PART No. CARTRIDGE	SONOTONE PART No. NEEDLE
M1		89TB *	Not Req.	89 *	Not Req.				

* Includes mount.

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA TRUETONE PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
M2						AFC (Pigtail)
M3	1N636					Ratio Det. (Pigtail)
M4	1N636					Ratio Det. (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M5	FM Tuner		(Standard Coil Part #1023A)
	FM Tuner		(Standard Coil Part #1023)
M6	Tuning Cap.	1024	AM, 2 Gang (Ant. 41-406mmf, Osc. 15-175mmf)
M7	Switch	420A	Function Selector
M8	Switch	1892A	Mono-Stereo (DPDT, Slide Type)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	2458	FM Tuning
Knob	2457	AM Tuning
Knob	2436	Aux. Tuning
Dial Plate	1651	

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

PHOTOFACT* Folder

WEBCOR MODELS EP4905-1, TP4905-1 (Ch. 14X295-1)

WEBCOR MODELS EP4905-1, TP4905-1 (Ch. 14X295-1)

MODEL EP4905-1

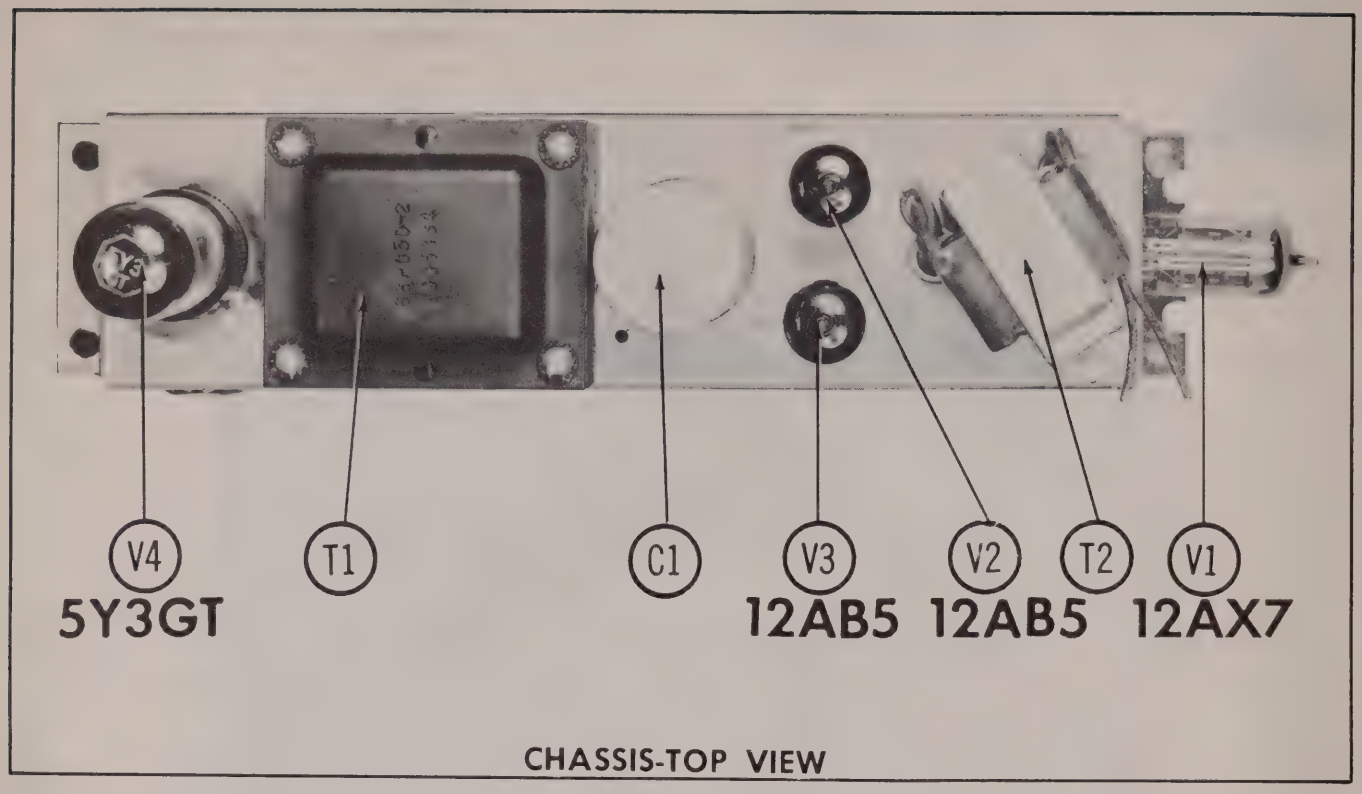
WEBCOR MODELS EP4905-1, TP4905-1 (Ch. 14X295-1)

TRADE NAME	Webcor Models EP4905-1, TP4905-1 (Ch. 14X295-1)
MANUFACTURER	Webcor, Inc., 5610 W. Bloomingdale Ave., Chicago 39, Illinois
TYPE SET	AC Operated 4 Tube Phono Amplifier
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 47 Watts, .46 Amp. @ 117 Volts AC

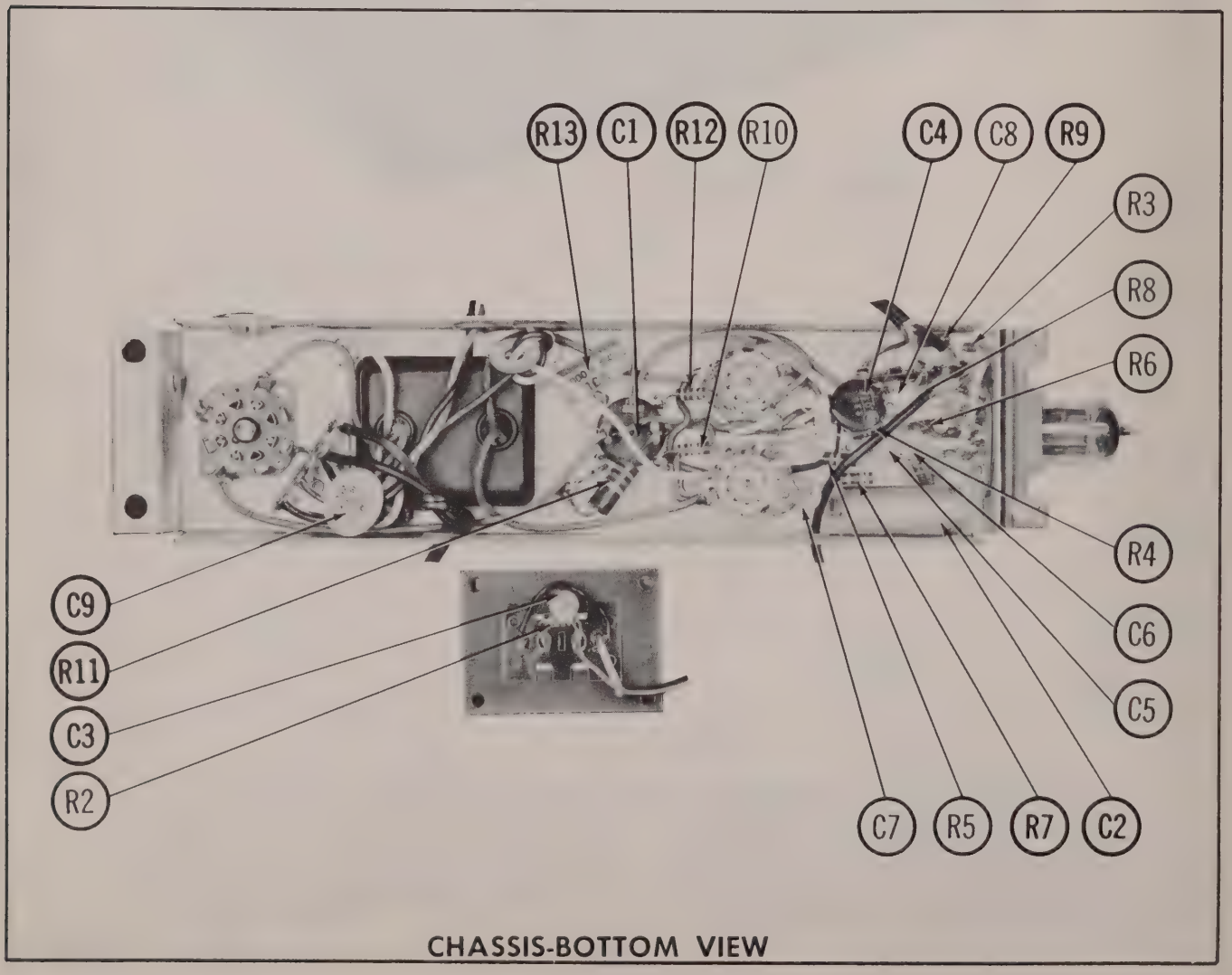
HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

JX351



CHASSIS-TOP VIEW



CHASSIS-BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

• CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA •					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	AF Amp. - Phase Inv.	12AX7	V3	Output	12AB5
V2	Output	12AB5	V4	Rectifier	5Y3GT

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	WEBCOR PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	400	30P292	AFH3-134	C1080	FP369.1	TMT-134	TVL-3744.2	
B	■40	350							
C	▲40	25							
C2	10	25	30P064	PRS25V10	BBR10-25	TC22	TD-10-25	TVA-1204	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	68 N750 10%		N750-DI 68	DTN-68	C10Q68U	CCTN-680	CN7-468	5TCU-Q68
C4	15000		BPD-015	DD16-153	BYA10S15	CCD-153	B-115	5HK-S15
C5	15000		BPD-015	DD16-153	BYA10S15	CCD-153	B-115	5HK-S15
C6	.05 400V		P488N-05	DF-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C7	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C8	.05 400V		P488N-05	DF-503	CUB4S5	4DP-3-503	GEM-415	4TM-S5
C9	10000 1400V		DAC-27	DD16-103	HVE16S1	16DP-3-103	2HV-110	BL-S10
C10	2mfd 25V		P1589ZXY-2.0		MP2W2		GTM-12	118P20502S2

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	WEBCOR PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	31P144	B-60-S	A47-500K-Z	Q13-133	U48	Volume
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			Not Req.	SWE-12	76-1	US-26	Off-On

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	6.8meg	
R3	2.2meg	
R4	270K	
R5	3900Ω	

ITEM No.	RATING	REMARKS
R6	470K	
R7	100K	
R8	4700Ω	
R9	100K	

ITEM No.	RATING	REMARKS
R10	470K	
R11	270Ω 2W	
R12	470K	
R13	1000Ω 5W	

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	WEBCOR PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .46A	520VCT @ .060A	5V @ 2A	68P050-2 ①						
	SEC. 3	SEC. 4	SEC. 5							
	12.6VCT @ .65A									

① Alternate Part # 68P060.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.1	SEC.	WEBCOR PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	9000Ω CT	6-8Ω	67P056							
	PRI.2									
	500Ω CT									

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	WEBCOR PART No.	QUAM PART No.	
SP1	6"	PM	6-8Ω	76P061	6A31Z8	
SP2	4"	PM	6-8Ω	76P050	4A1Z8	

CABINETS & CABINET PARTS

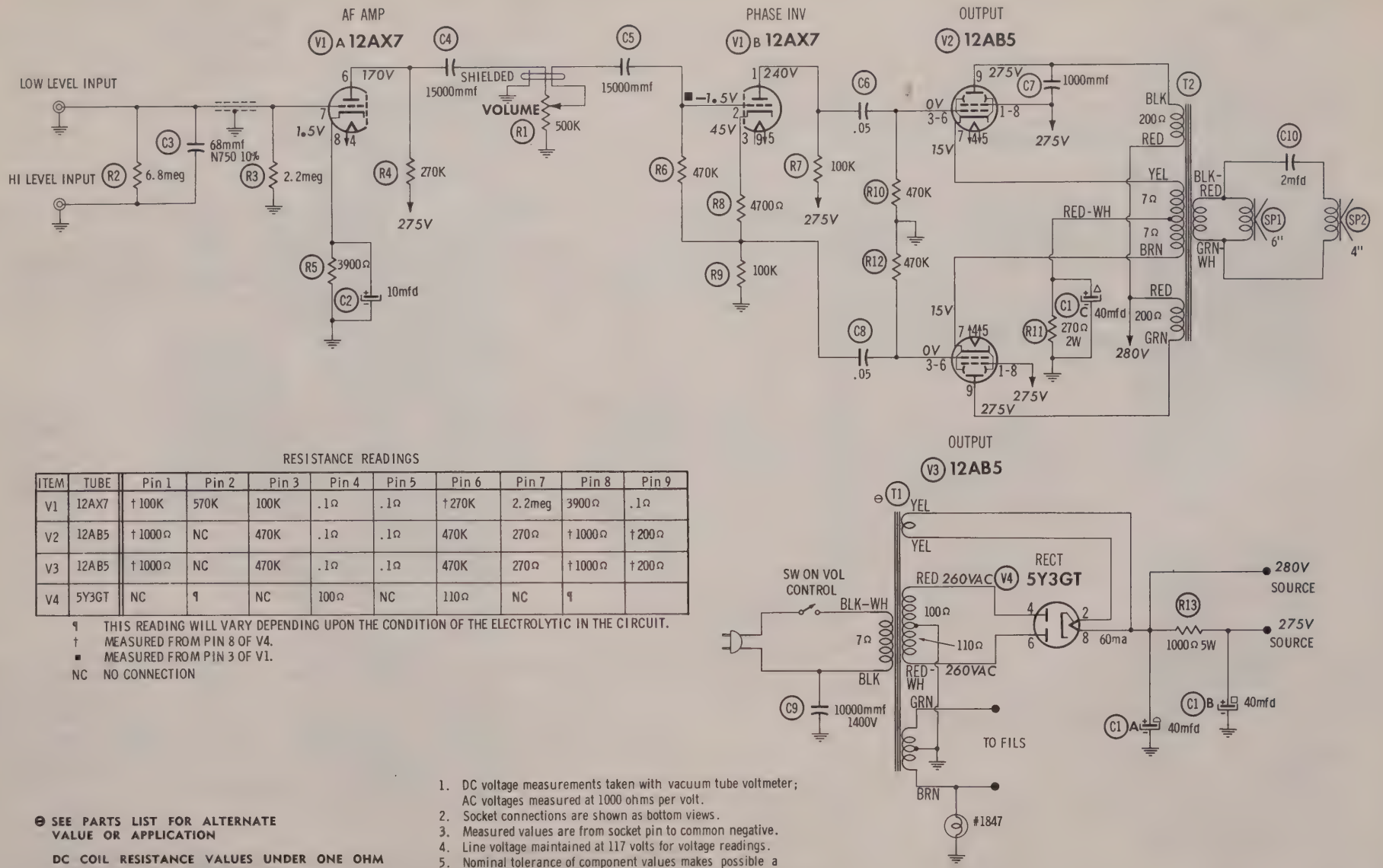
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	39P213-1	Volume, Model TP4905
Knob	39P213-2	Volume, Model EP4905
Cabinet	92X093-1	Model TP4905
Cabinet	92X093-2	Model EP4905

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†100K	570K	100K	.1Ω	.1Ω	†270K	2.2meg	3900Ω	.1Ω
V2	12AB5	†1000Ω	NC	470K	.1Ω	.1Ω	470K	270Ω	†1000Ω	†200Ω
V3	12AB5	†1000Ω	NC	470K	.1Ω	.1Ω	470K	270Ω	†1000Ω	†200Ω
V4	5Y3GT	NC	¶	NC	100Ω	NC	110Ω	NC	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 8 OF V4.
■ MEASURED FROM PIN 3 OF V1.
NC NO CONNECTION

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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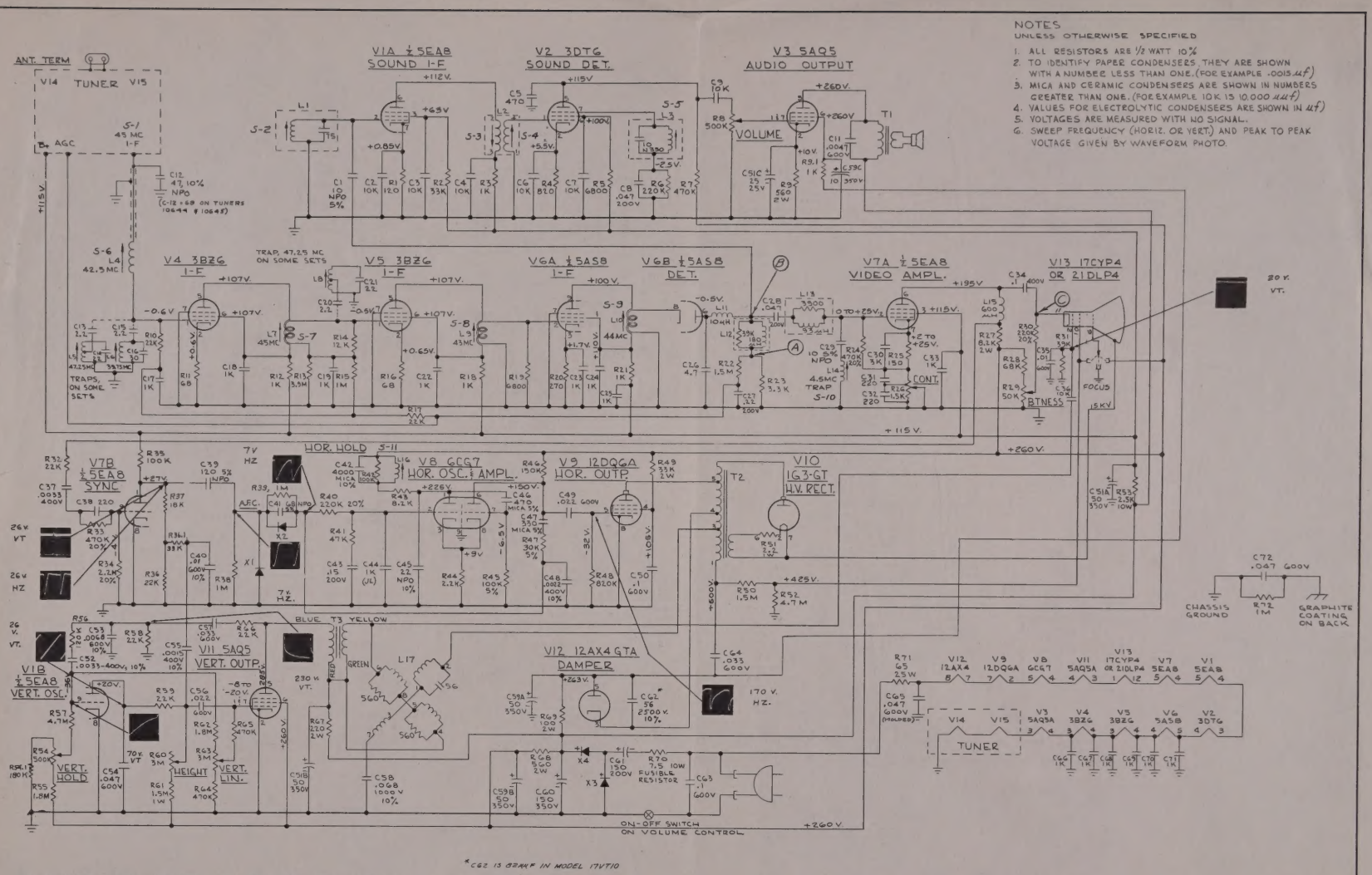
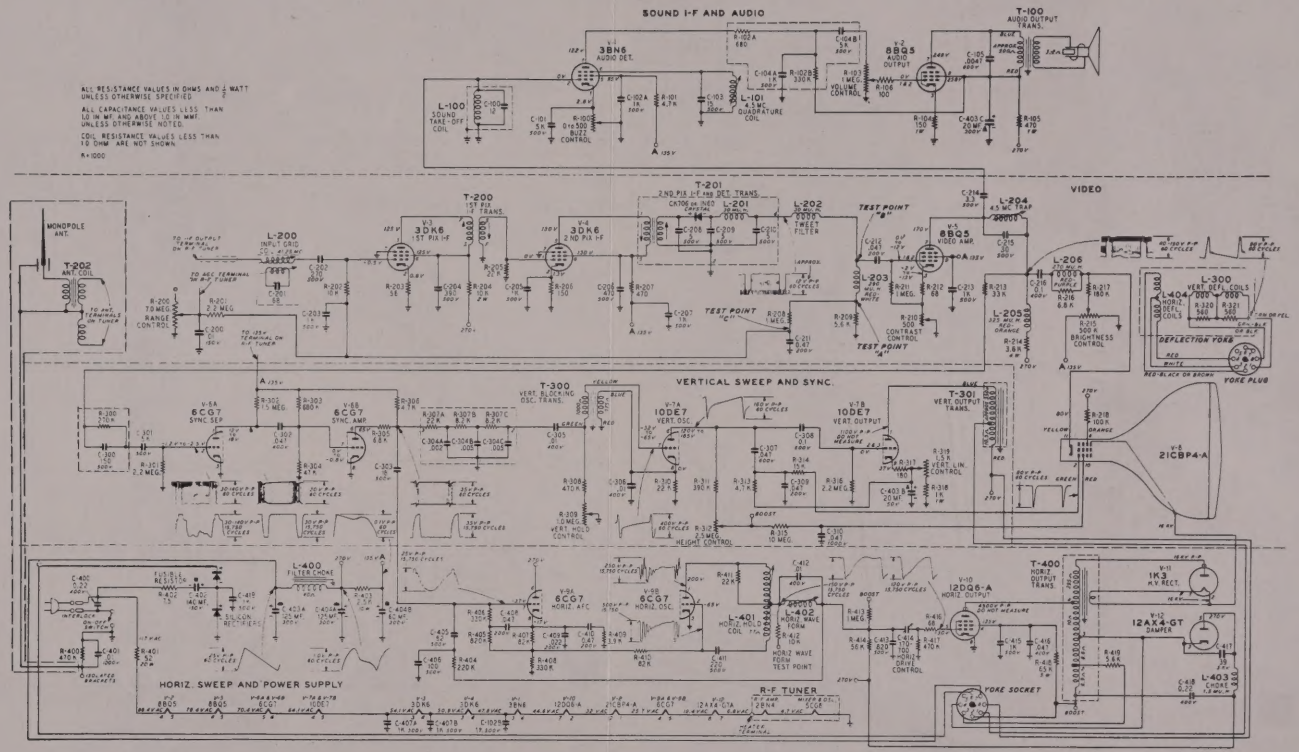
WEBCOR MODELS EP4905-1, TP4905-1 (Ch. 14X295-1)


NOTES
UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE 1/2 WATT 10%
2. TO IDENTIFY PAPER CONDENSERS, THEY ARE SHOWN WITH A NUMBER LESS THAN ONE. (FOR EXAMPLE .0015 μf)
3. MICA AND CERAMIC CONDENSERS ARE SHOWN IN NUMBERS GREATER THAN ONE. (FOR EXAMPLE 10K IS 10,000 μμf)
4. VALUES FOR ELECTROLYTIC CONDENSERS ARE SHOWN IN μf)
5. VOLTAGES ARE MEASURED WITH NO SIGNAL.
6. SWEEP FREQUENCY (HORIZ. OR VERT.) AND PEAK TO PEAK VOLTAGE GIVEN BY WAVEFORM PHOTO.
ANT. TERM
V14 TUNER V15
V1A 1/2 5EA8 SOUND I-F
V2 3DT6 SOUND DET.
V3 5AQ5 AUDIO OUTPUT
VOLUME
V4 3BZ6 I-F
V5 3BZ6 I-F
V6A 1/2 5AS8 I-F
V6B 1/2 5AS8 DET.
V7A 1/2 5EA8 VIDEO AMPL.
V13 17CYP4 OR 21DLP4
20 K. VT.
FOCUS
BTNESS
1.5 KV
TRAPS, ON SOME SETS
TRAP, 47.25 MC ON SOME SETS
4.5MC TRAP
CONT.
+115 V.
+260 V.
V7B 1/2 5EA8 SYNC
HOR. HOLD
V8 6CG7 HOR. OSC. & AMPL.
V9 12DQ6A HOR. OUTP.
V10 1G3-GT H.V. RECT.
AFC.
7V HZ
26 V VT
26 V HZ
V1B 1/2 5EA8 VERT. OSC.
V11 5AQ5 VERT. OUTP.
VERT. HOLD
HEIGHT
VERT. LIN.
230 V. VT.
70 V. VT.
BLUE T3 YELLOW
RED
GREEN
V12 12AX4 DAMPER
170 V. HZ.
ON-OFF SWITCH ON VOLUME CONTROL
CHASSIS GROUND
GRAPHITE COATING ON BACK
TUNER
*CG2 IS 82 μμF IN MODEL 17VT10

PACKARD BELL MODELS 17VT10, 21VC8, 21VT6 (CH. V8-3)

Schematic Diagram Courtesy of Packard Bell Electronics Corp.


SOUND I-F AND AUDIO
VIDEO
VERTICAL SWEEP AND SYNC.
HORIZ. SWEEP AND POWER SUPPLY
R-F TUNER
DEFLECTION YOKE
YOKE PLUG
YOKE SOCKET
TEST POINT
ALL RESISTANCE VALUES IN OHMS AND ± WATT UNLESS OTHERWISE SPECIFIED
ALL CAPACITANCE VALUES LESS THAN 1.0 IN MF AND ABOVE 1.0 IN MMF UNLESS OTHERWISE NOTED.
COIL RESISTANCE VALUES LESS THAN 1.0 OHM ARE NOT SHOWN.

TRUETONE MODELS 2DC1030A, 2DC1032A, 2DC1034A, 2DC1036A, 2DC2030A

Schematic Diagram Courtesy of Western Auto Supply Co.

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